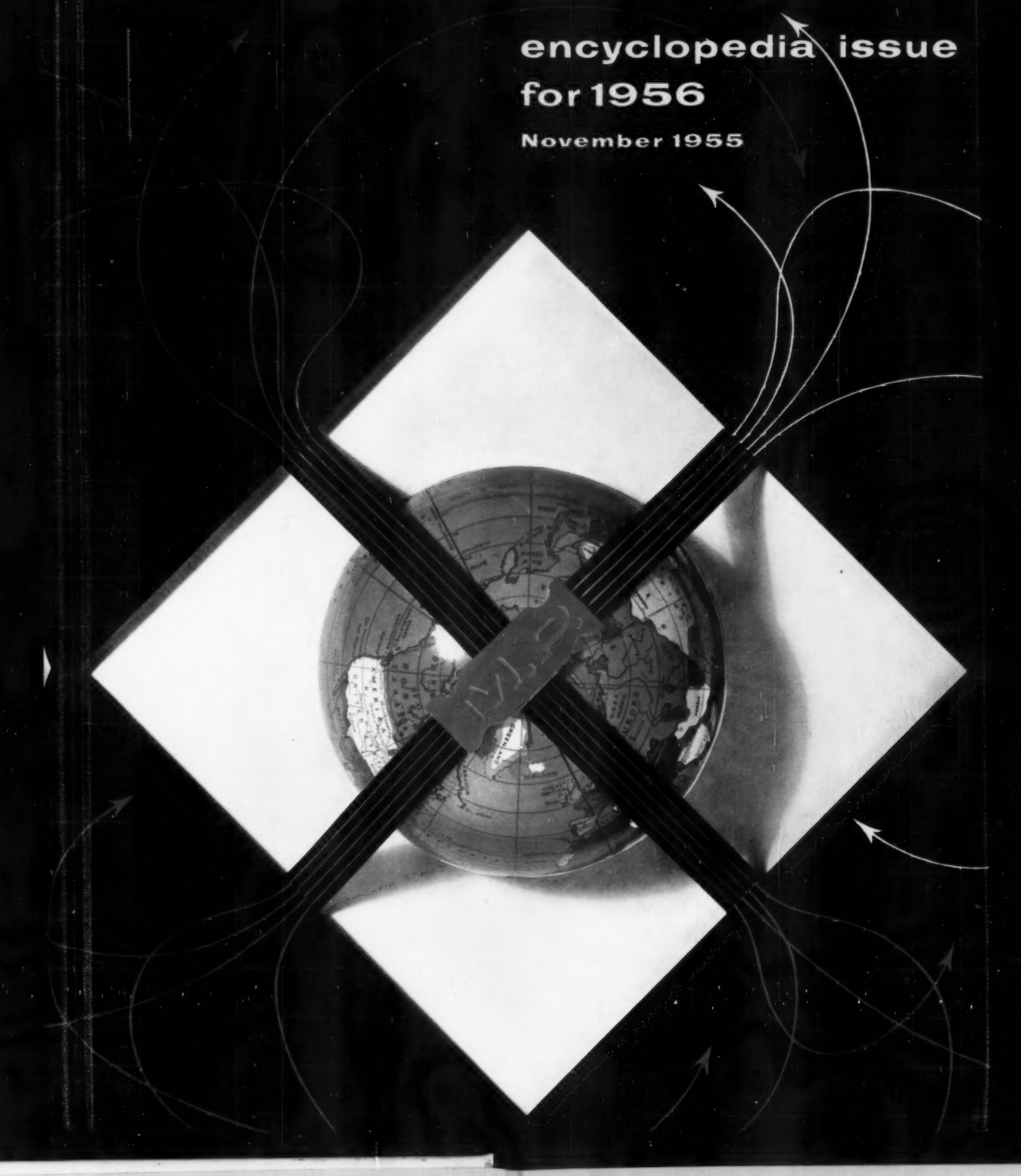
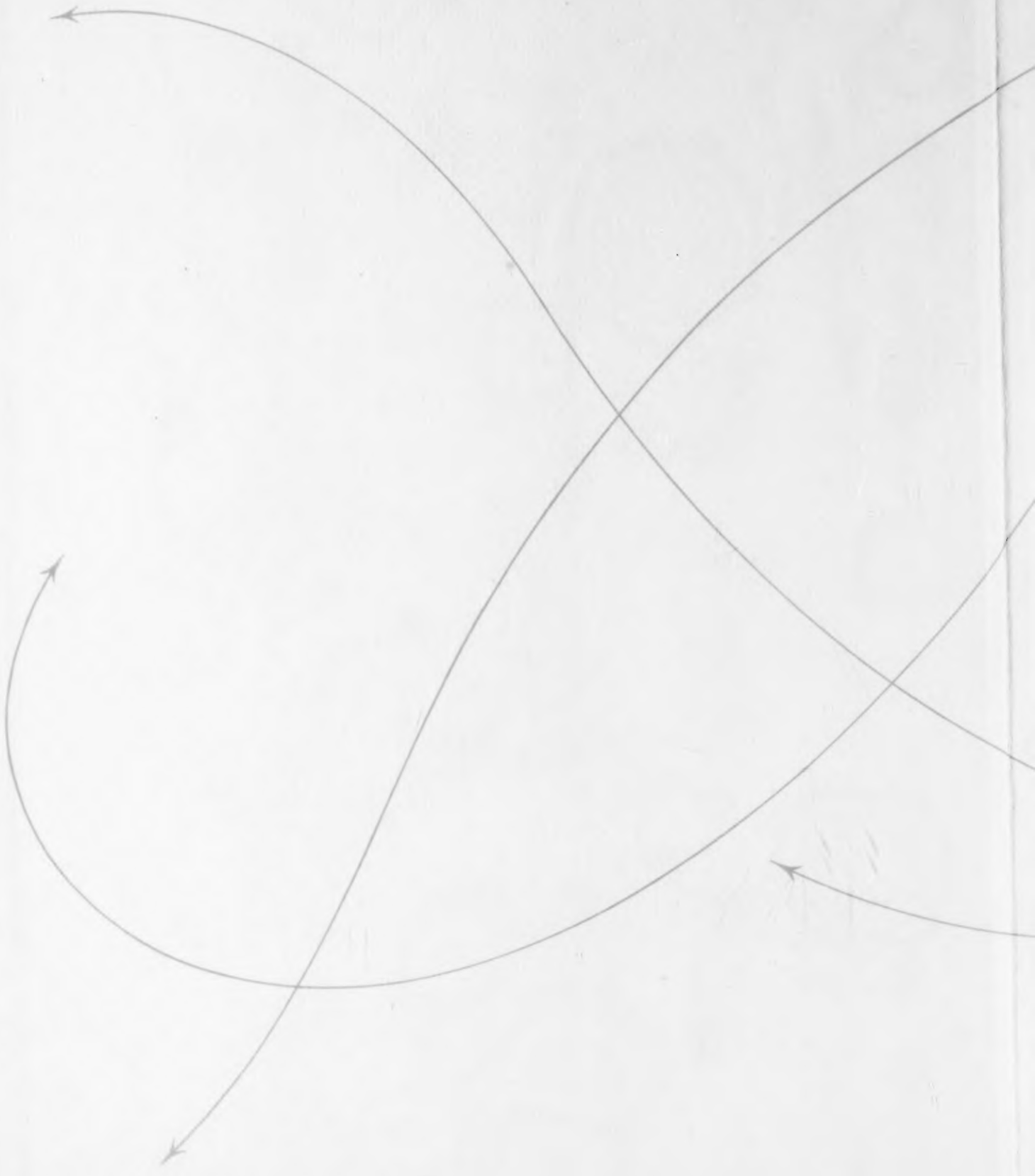
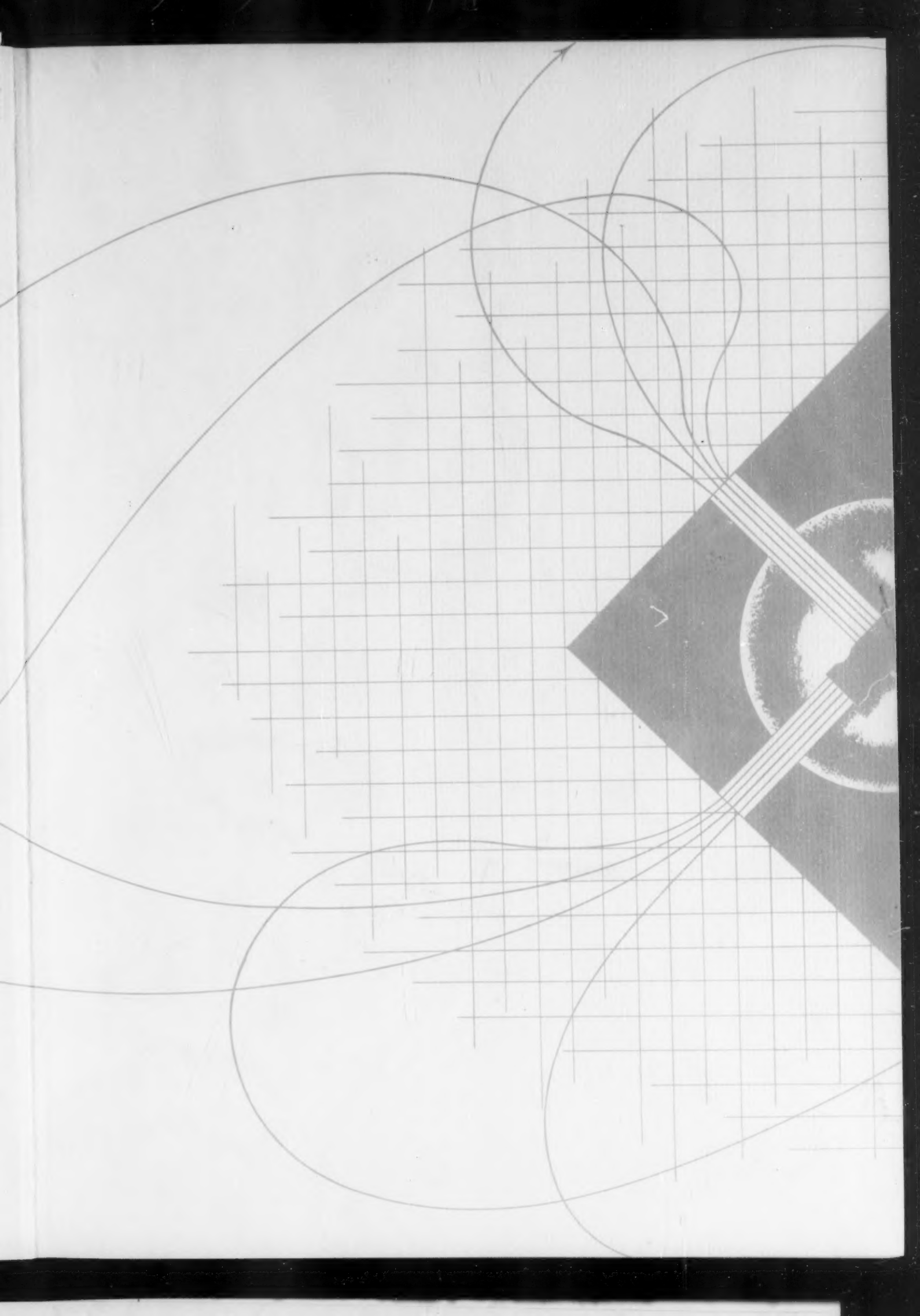
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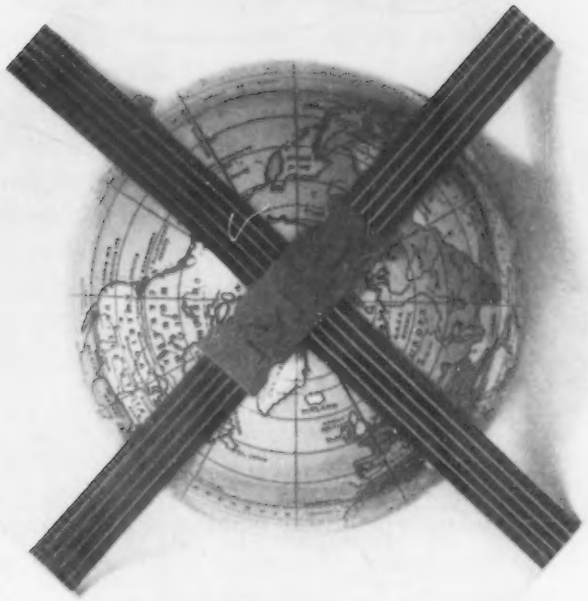




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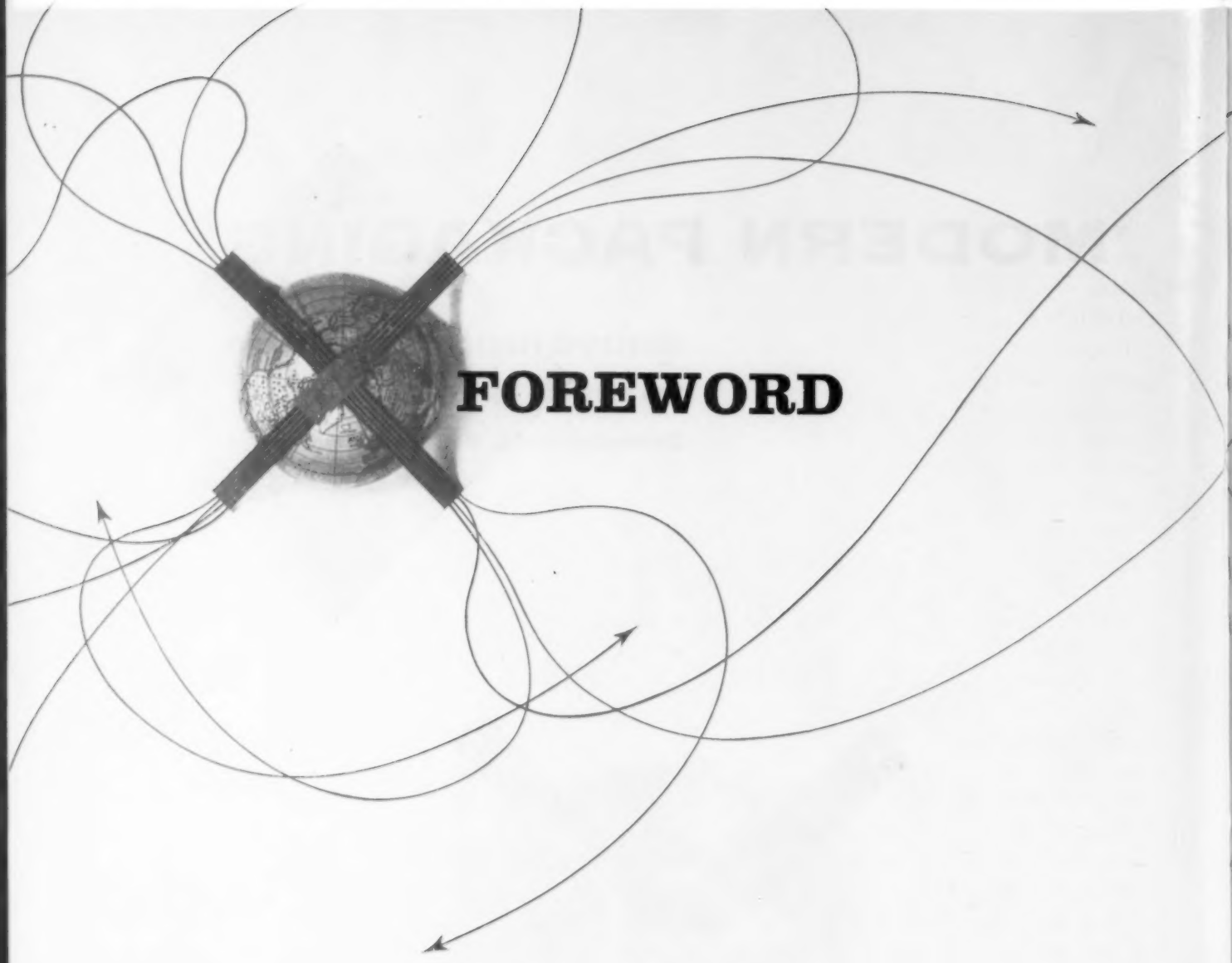
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FOREWORD

This edition of the MODERN PACKAGING ENCYCLOPEDIA ISSUE is designed as an "idea" book for the packager who seeks to increase the efficiency of his packaging production or improve the protective and merchandising features of his packages. The know-how in this issue is the culmination of 27 years of producing an annual workbook for the packaging field.

The Encyclopedia is specifically designed for use throughout 1956. Many experts in their respective lines have contributed fresh information on how to cut costs and increase efficiency. Throughout this volume there is major emphasis on what's new in materials, packages and merchandising methods. Information has been broadened to cover the widest possible range, including low-pressure polyethylene, polyester film, foamed plastics, plastic aero-

sols, new paperboards, new uses of cans and glass packages, the forward march of paperboard boxes and fibreboard shipping containers, plus rapidly rising new techniques both in merchandising and industrial packaging.

Properties charts and tables, always an important time-saving feature of the Encyclopedia, are reinforced this year by significant newcomers, including statistical tables (pp. 46 and 47); listings of Federal and state agencies regulating packaging (pp. 38 and 42); a table comparing costs of papers, plastic films and foils (p. 105); an aerosol propellant chart (p. 327), and a protective packaging properties chart (p. 672).

In the reader's interests, an effort has been made to capsulate basic information. Quicker and more comfortable reading is provided because the book is side stitched so that it opens easily and lies flat. Thumb tabs for attachment have been inserted in this book so that major divisions can be turned to easily and quickly.

How to Use. An important new feature this year is the indexing of all products advertised in each section on a special page opposite the title page for that section.

The advertisements in this edition in many cases represent new high standards in trade-press advertising—in respect to information, attractiveness, completeness and helpfulness. The Editors feel that all readers should consult the advertisements as a valuable supplementary source of general information and for specific data on materials and equipment desired.

As usual, the Table of Contents, Index and section title pages should be consulted when seeking information on any subject.

The Buyers' Directory (p. 679) contains an alphabetical subject index covering every significant packaging supply, machine or service available. It offers detailed, classified lists of specific types of materials, containers and packaging equipment and tells who makes them (pp. 686 to 737). It lists custom services, including contract packagers, custom finishers and coaters, package designers and research laboratories (p. 738). The names (and addresses) of every company listed in the directory appear in a separate alphabetical list (p. 745). The Directory merits careful study, for it includes almost 500 classifications of packaging needs. Many new items have been added, and all listings were edited individually and are based on information obtained in 1955 from each supplier listed.

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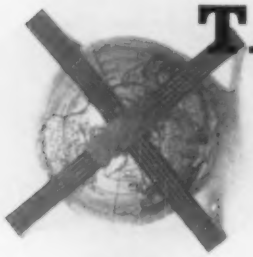
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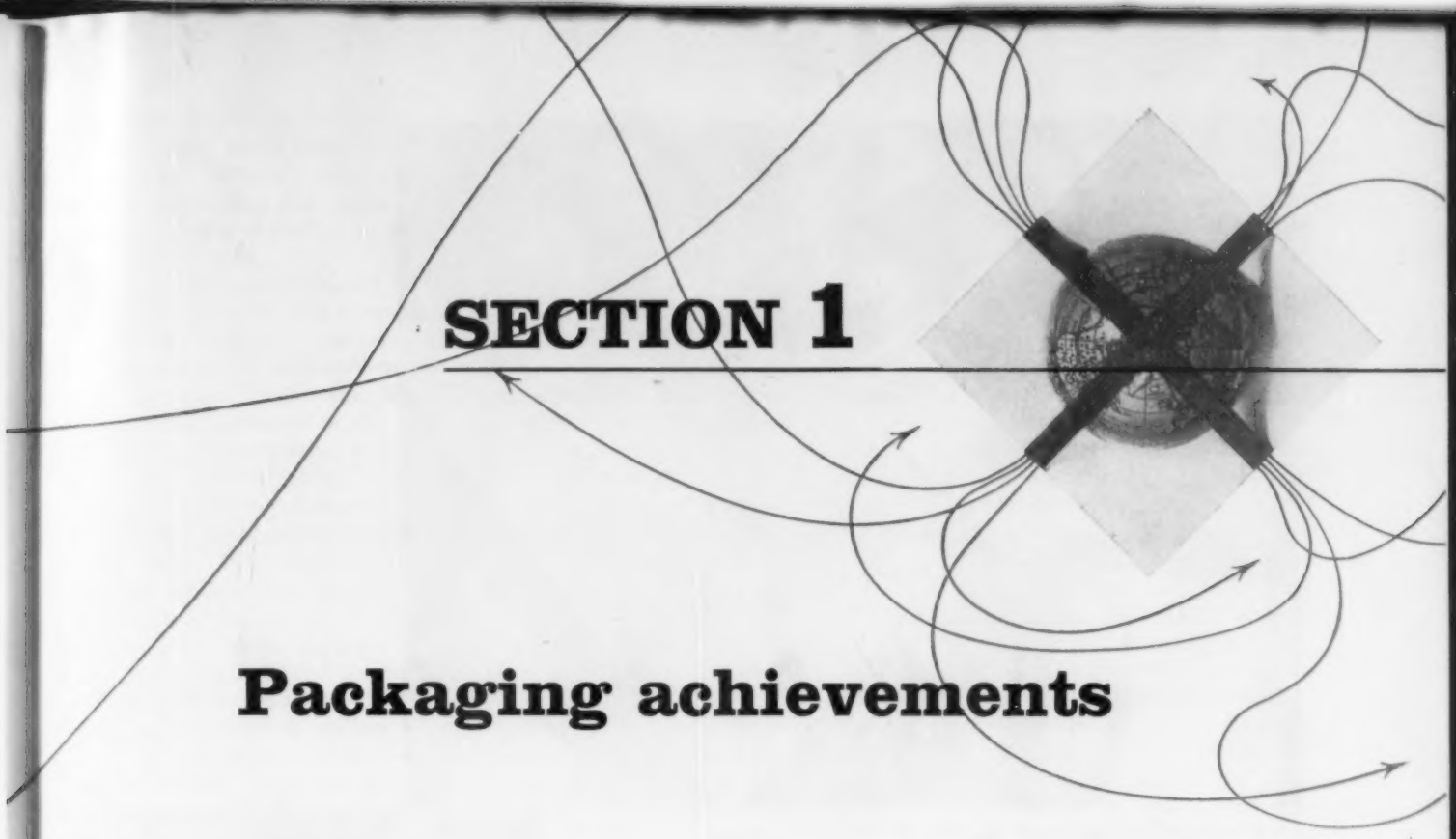
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SECTION 1

Packaging achievements

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Chipboard pallet placed over the base of IBM electric typewriter is held to shock-mounting studs with tinnerman nuts. Method produces a 10% cost saving in materials used.



The new IBM package is not only less expensive but also affords an easy-opening tear strip and improved surface design that helps advertise the product during shipment.

Cost-cutting case histories

The following case examples were chosen from an extensive survey aimed at sampling the best in packaging thinking as it is being practiced today. Each of the actual cases that follow was selected because (1) it was found to be representative of numerous similar programs of packaging improvement and (2) the objective of the program, while measured in terms of important dollar savings, was aimed basically at increased efficiency both in production and in merchandising potential.

The approaches to packaging improvement that loom most important in current operations are (1) package overhaul or adoption of a new material or package, (2) methods improvement and mechanization and (3) standardization of packages and components. In most cases the above approaches overlap and usually an advance on one front means new opportunity to improve in the other categories.

Package overhaul

One outstanding example of a new approach in packaging that resulted in impressive savings is found in the experience of the International Business Machines Corp. This firm through the packaging division of its industrial engineering department at its Poughkeepsie, N. Y., plant has developed an improved package for the IBM Electric Typewriter that permits annual savings of approximately 10.9% of former material costs. The new package not only does a better job of protecting a valuable product at a savings, but it even provides for new features including an easy-opening tab and new artwork that increases the appeal of the surface design.

Essentially, the improved package involved the mounting of the typewriter on a chipboard pallet, which is held to the shock-mounting studs on the base of the typewriter by tinnerman nuts. The metal tie bar was replaced by one of wood. The adoption of expendable shipping hardware reduced costs and also eliminated handling costs of returning nonexpendable hardware to the factory. Better shock mounting permits the replacement of the former double-walled 350-lb. fibreboard carton with a sin-

gle-walled 275-lb. carton—giving a material saving and a lower shipping weight. An automatic case sealer, adopted for sealing the carton, also contributed to a reduction in material and labor costs.

Perhaps the most significant statement to be found in IBM's report of its improved program is the fact that the *opportunity for improvement* became apparent through the *normal cost-reduction activities* of the engineering department. Here is a clue that might well trigger some of the most far-reaching improvements available in any packaging program. In other words, does your packaging program include cost control and *normal* cost-reduction activities?

The number of new packages available to the packager and the improvisations that can be made on conventional containers is endless, as a study of the various sections in this book will show. Examples similar to the experience of IBM could be repeated for many companies.

Davis & Hemphill, Eldridge, Md., for example, has adopted corrugated shippers for a number of its machine screw products. The U. S. Radiator Corp. formerly packaged one of its hot-water heaters in four bulky and complicated packages. Assembly and the matter of lost parts were formidable problems. The heater itself was redesigned and now the model is shipped in a single wirebound box so that the product will almost install itself. Obviously, the single-unit package is easier to assemble and ship, and it saves material and labor costs. The American Brass Co. has adopted a set-up box and a polyethylene pouch for flexible metal connectors. The old way required capping ends of the product by shrinking on vinyl chloride film to keep the inside clean, attaching the instruction tag with a wire tie, wrapping in corrugated, assembling in a corrugated sleeve, gluing on labels and stamping on size by hand. The new package is simpler, more efficient and has a vital plus element—improved appearance.

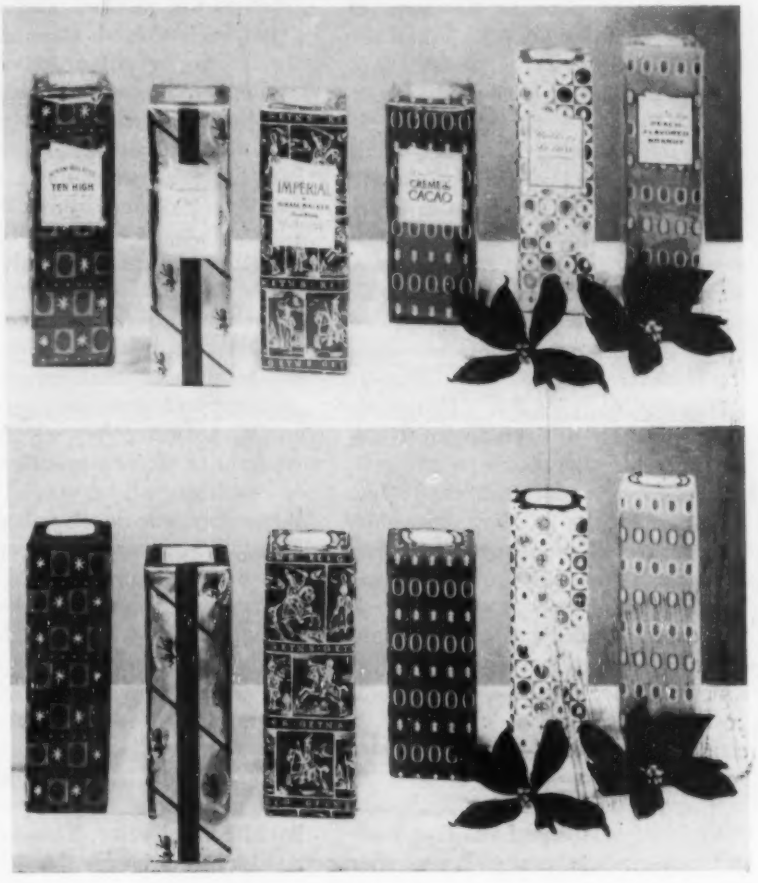
Methods and mechanization

A striking example of an improved method of packaging sliced bacon is found in an operation at the Tobin Packing Co., Inc., Albany, N. Y., where a line has been developed to shingle and weigh bacon automatically. For years the labor required to hand weigh a pound or a half-pound of bacon has been a large item in the cost of packaging bacon. The usual practice is to slice bacon in a continuous operation, then weigh each pound or half pound. Tobin has, through its own research, developed a machine that automatically weighs out a pound or a half pound of bacon and automatically places it on a card. The card is folded automatically and goes into an automatic bacon-wrapping machine. The bacon is not touched by human hands and the yield is said to be increased 4% as the result of greater accuracy. On an average bacon packaging line employing 14 to 16 persons, the work is now being done by five operators. Floor space is reduced from 65 to 31 ft. An improvement in the appearance of the bacon is claimed for this method because the bacon is shingled evenly, mechanically. Tobin reports that the clue to the improvement in its packaging line stemmed from the company's determination to research the problem until it was solved. Five different slicing and weighing machines were produced before a successful model was found.

At the Foy Paint Co. in Cincinnati, a new concept in the method of packaging paint has resulted in a change-over from a manual, batch operation method to a line consisting of a semi-automatic packer, an automatic gluer and sealer and a case printer that prints the Foy trademark and identifying information on the cases. The Foy installation is believed to be the first automatic line in the paint industry. The line reportedly handles 50 to 75% greater volume than the previous line and permits packaging on a schedule that is less subject to peaks and valleys.

Hiram Walker, Inc., Detroit, has developed a method in its packaging of whiskey for gift sales. The new method involves the packaging of the bottle in a plain white carton. The carton is then gift wrapped and an outer cellophane wrap carrying brand name, company name and other conventional as well as mandatory labeling is applied. The machinery that puts the bottles in the cartons is said to be the first automatic equipment developed for this use in the liquor industry. Essentially the

New Hiram Walker packages feature convenience for users. Removal of cellophane label provides package that is handsomely gift wrapped.





New bacon weighing and shingling machine effects important labor savings.

purpose in back of the double wrap is to provide the dealer with a sales-making package that is already gift wrapped, thus saving his time during the rush season when his time is most needed to serve customers. The customer can remove the outer wrap before he sends the gift package, for the printed wrap has by that time served its purpose in the store of product identification and it has also met the requirements of the law, which, of course, pose problems in packaging liquor not generally encountered by other products. While this development cannot be considered a cost-cutting example as it applies to the packager, it can be considered very important as a means of saving the retailer time and materials and it saves the customer the added effort and expense of gift wrapping the bottle.

The National Tea Co., Chicago, reduces breakage in the filling of its 24-oz. nonreturnable bottle by chilling the beverage to approximately 38 deg. F. prior to the bottling operation. This reduces the pressure on the bottles. Since the bottles then sweat profusely offering a surface that is particularly unreceptive to high-speed labeling, the company installed a new labeling machine that assures positive adherence of labels with a continuous pressure technique plus a special glue formulation.

The Fanny Farmer Co., Rochester, N.Y., faced with a problem that many candy companies as well as other firms encounter, felt the need for a simplified and efficient way to identify packed boxes of candy so that the name of the varied assortment would appear on the outer or store wrap. A name labeling attachment installed on the wrapper does the job very well. The attachment imprints in sharp clear lettering the name of the assortment at any predetermined location on the wrapping paper at one end of the box. The imprint can be made in a wide choice of colors to harmonize with the wrapper. The name of the assortment or the color of the imprint can be easily changed. According to an authority at Fanny Farmer, this approach has solved the company's problem of assortment identification and at the same time has added to the attractiveness of the packaged product.

In a different set of circumstances and with different products, bundling in transparent film can also solve the problem of identification and speed inventory taking and stock selection.

S. C. Johnson & Son, Inc., Racine, Wis., employs five 28-valve and one 20-valve gravity-type fillers of standard design. These were producing at maximum capacity as rated by the manufacturer. However, production requirements were increasing and the question was whether machine output could be improved. Careful study of the filling operation indicated that an improved means of controlling the float level in each bowl might be the means of achieving plus operation. An investigation was made in regard to the use of vacuum and a shorter lift cam track as a means of better performance. As a result of this work it was determined that a 50% increase in the height of the filling bowl would produce a substantial increase in capacity without the complication of vacuum and new cam tracks. The bowls, accordingly, were changed to conform to the new specification.

Simultaneously a special recessed tip washer was developed to provide about 50% more surface contact and assure positive contact against leaks.

Finally, a pneumatic system of controlling the bowl level was developed. This system allows a small stream of air bubbles to be introduced below the liquid surface with a means of measuring the back pressure resulting from a given height of liquid. This in turn actuates a diaphragm-operated liquid control valve. The new system consistently provides the desired plus or minus one-inch float-level control. The average filling speeds on pints have increased from 158 tins to 196 tins a minute. Quarts have risen from 120 to 150; half-gallons from 55 to 68 and gallons from 35 to 46 units a minute. In general the percentage increase has been about 20% on all sizes.

Standardization

An historic road to an improvement in packaging and a reduction in cost has been standardization of materials, packages and methods. The bigger the operation, of course, the greater the need for package standardization. Just how big the job can be and how important is revealed by the package simplification program that the Socony-Vacuum Oil Co. is conducting. Socony's program has been under way for five years. As a result they are now using 48.8% fewer package sizes and the ultimate goal is a reduction of 62.7%. Socony has reduced the variations of lithography and printing by 52%, with the ultimate objective of reducing it by 69.5%. In 1950, the company required 264 sheets of paper to handle the necessary tabulation. Similar data in 1954 required only 134 sheets—a 49% cut in paper work.

Socony's program was set up by the board of directors and was conducted by an office of package coordinator and two committees. The committees reviewed brands and packages for possible simplification.

There have been many other notable package standardization programs. Some years ago Sharp & Dohme reported that its standardization and simplification program was producing savings of $391,000 a year. Nearly $50,000 was saved as a result of the company's glass container studies, which covered bottle sizes, closures, liners, labels, secondary packs and corrugated shippers. As a result of this study 62 bottle sizes were reduced to 28 and more manageable inventories resulted.

There is no reason to believe that standardization, when properly conceived and administered, will lead to package stagnation or restrict the operations of a company. Instead standardization, because it produces simplification and permits better budgets to work with, actually gives the packager greater freedom and generally results in packages that are easier to handle and that do a better selling job.

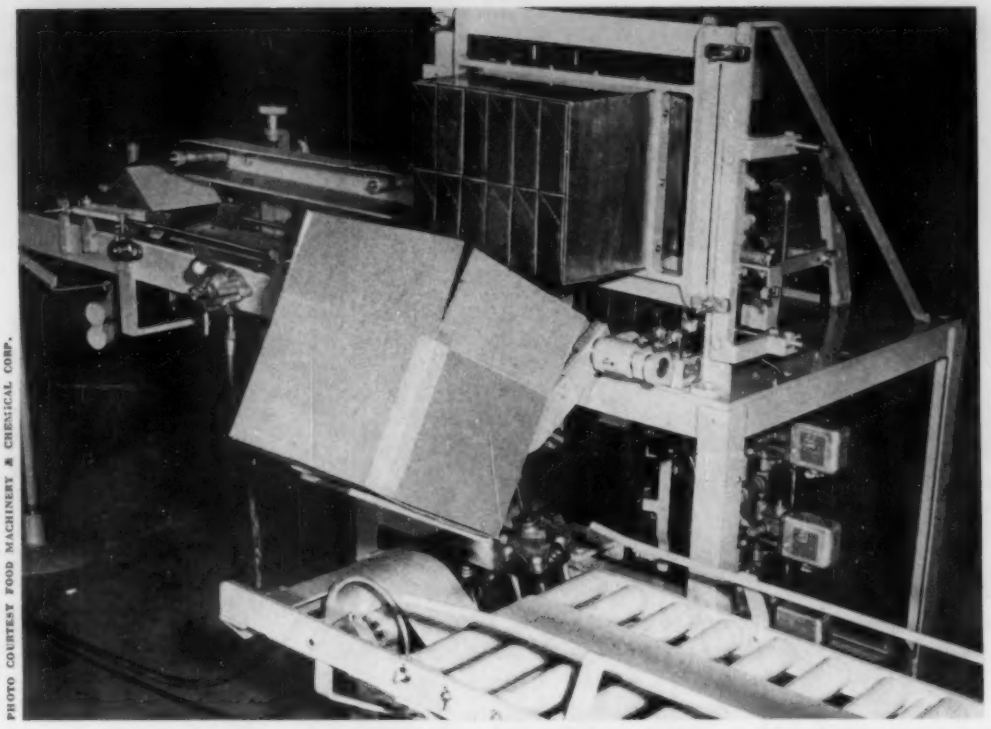


PHOTO COURTESY FOOD MACHINERY & CHEMICAL CORP.

New progress in frozen-food packaging is made possible by this machine that permits mechanical loading of bulging frozen-food packages. Unit packs 12- and 24-carton cases.

New materials, packages and equipment

The packager looking to the future might well ask himself when there has ever been a more abundant prospect of new materials, new packages, new methods and equipment plus new applications of all packages to the task of moving merchandise in mass volume and wonderful variety. The truth is that packaging appears to be on the verge of another one of its forward cycles and everywhere the packager turns he will find opportunities. In the months ahead he will be challenged to test, evaluate and successfully adapt materials and techniques now emerging in quantity.

A particularly good place to start in appraising the new directions in packaging is in the field of plastics. Conventional or high-pressure polyethylene is being produced in an ever-increasing number of grades to provide specialized or tailored-to-fit performance. Transparent polyethylene film is becoming a reality and improved qualities are being provided in molded polyethylenes. Now on the horizon is a new polyethylene called low-pressure or linear type.

What can the packager expect from this material? It is, reportedly, stiffer, stronger and it is unaffected by heat at temperatures up to 250 deg. F. Thus it can be sterilized. In due time, it will undoubtedly result in new uses of polyethylene in packaging.

Low-molecular-weight polyethylene is also expected to find additional packaging applications. There has, for instance, been talk that it might be used to coat bottles to increase release properties. Another important area for investigation is the possibility of using polyethylene film as a base for coatings to give polyethylene improved properties. Surface treatments, of course—heat, electricity or additives—have already started polyethylene on the road to improved printing, handling and adhesive sealing.

What are some of the highlights in the current use of polyethylene? Approximately 60% of the 120 million lbs. of polyethylene film produced in 1955 will have been used in packaging. Approximately 70 million lbs. of film were produced in 1954. Bottles, reportedly, will have consumed about 9 million lbs. in 1955 as compared with 7 million lbs. in 1954.

Polyethylene has been vacuum formed and adapted as a package for cottage cheese. Polyethylene film usage is constantly expanding in produce packaging. One important application is in the packaging of bulk bananas as well as retail units. The polyethylene tube has made important gains as a package for adhesives, soap creams, powders, paints and similar items. In England, polyethylene-coated parchment has been introduced as a butter wrap.

Polyester film (Mylar) is now available in commercial quantity. It is being used as a window film and also as a bag material. This new film has excellent strength and barrier properties that can be valuably employed to increase the shelf life of self-service packaged products.

There is an increasing interest in foamed plastics. Foamed polystyrene is already being used advantageously as a cushioning or display insert. Alka-Seltzer is now packaged in a vial that has a foamed-polystyrene plug re-

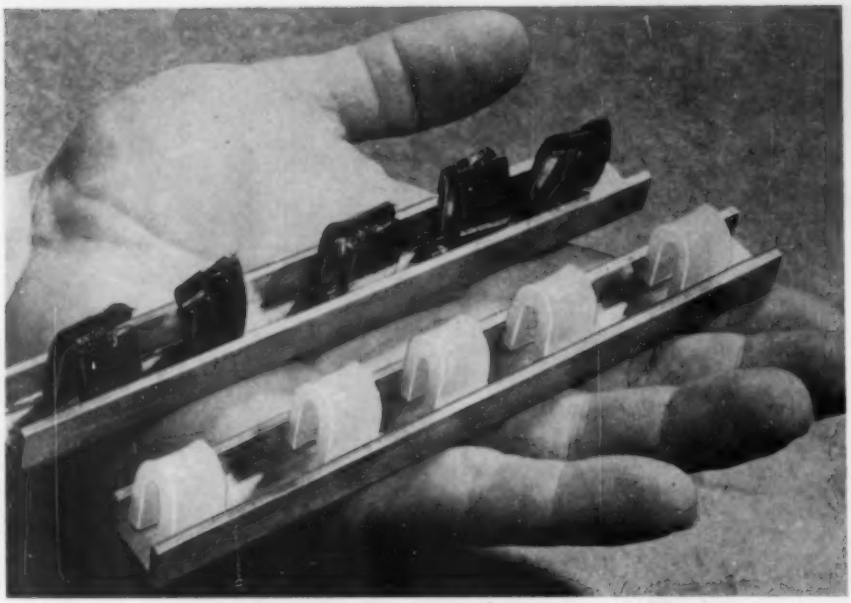


PHOTO COURTESY KOPPERS CO., INC.

New low-pressure polyethylene (white) resists bending after long soaking in detergent. Conventional polyethylene (black) cracked in the same test.

placing cotton. Foamed vinyl and foamed urethane (and possibly foamed polyethylene) are spoken of as materials that have potential applications in packaging. A wide range of properties and characteristics can be considered. Importantly, the foam plastic offers new opportunities in molding and forming contours—and from the inside out.

Vinyl plastics have made some important news in recent months. Dan River Mills adopted an extruded vinyl film as a wrap for textiles. The wrap was chosen for its excellent strength properties and adaptability to beautiful printing. A transparent rigid vinyl box has been developed for dried fruits. A means of molding vinyl liners in crown closures has been developed and it is predicted this type of liner will be important from the standpoint of tight seals and uniformity. A major packager of ice cream has a package that employs vinyl to mold ice cream into fancy prints.

There has been increasing use of other packaging plastics and some like nylon may soon be of greater interest.

Lamination combinations are in the news every day. One of the most interesting is a combination of Pliofilm and glassine to produce a new pouch material for automatic packaging of institutional packages of coffee.

Improved boxboards and label stocks have made their appearance within recent months. In addition there have been innovations where printing is concerned. Perhaps never has it been more profitable to query the supplier when improved performance is needed.

Aluminum foil is enjoying a boom and the foil pan package in particular is proving an excellent means of selling more packaged products.

Functional packages

Equally as important as new materials are the adaptations of materials in the creation of selling packages, convenience packages, working packages. In fact, if any trend in packaging were to be selected as outstanding, the trend to functional packages would be a foremost candidate.

Among the dispensing packages are the ball-point closures for a deodorant and for an adhesive. Bristol-Myers, in developing its roll-on package for Ban under-arm deodorant, pioneered a genuinely new type of dispensing package.

A metered valve that automatically shuts itself off has been introduced for an aerosol perfume. And a weed-killer aerosol has been introduced with an attached handle so that the user can knock off weeds without bending over. A newly developed melamine plastic aerosol has some potentially wonderful advantages for cosmetics, drugs and other personal products.

Sani-Flush bowl cleanser has adopted a snap-off polyethylene cap that replaced a pry-up lid whose design had ruled for 43 years. A popular brand of cleansing powder now comes to the customer with the sifter holes pre-punched. A strip of pressure-sensitive tape, automatically machine



PHOTO COURTESY PLASALL, INC.

New combination for vacuum forming is paperboard sandwiched between vinyl sheet. Hinge is formed in.



PHOTO COURTESY DU PONT

Important packaging advantage afforded by these new polyester-film bags is strength that increases shelf life.

applied over the holes, keeps the powder from spilling from the can prior to use.

There have been important new developments in regard to closures for jars and bottles. The lug-type vacuum cap, for example, has come to the fore in answer to the housewife's interest in closures that open and close more readily. Glass containers, themselves, have experienced steady gains in the number used and the variety of uses. Improved strength, lighter weight and infinite adaptability are major factors, but the convenience of the many types of closures available, including an endless stream of new variations, helps keep glass important in new packaging applications. This is especially true where convenience-type products are concerned.

The packager of industrial products is also beginning to discover the merits of the "working package." The Allen-Bradley Co. is meeting the growing challenge of automation by packaging resistors and capacitors on narrow belts of pressure-sensitive tape. The tape is wound on reels and is shipped to the customer so that it can be fed automatically into an assembly operation. The potential of working packages like this in the industrial field can scarcely be overestimated even by the most enthusiastic suppliers, product manufacturers and users of industrial products. It is safe to say that the development of convenience and working packages for fabricators, convertors, contractors, automobile agencies and for craftsmen has only begun.

Alemite grease fittings are now strip packaged and are fed on a reel from the carton. A package somewhat similar in principle is a die-cut carton adopted for Sera-Sharp blood lancets. The individually packaged lancets feed from a hole in the bottom of the carton. A compartment in the back of the carton is a receptacle for discarded lancets. The principle is the same as that used for razor-blade discards.

Tins of Anacin tablets are dispensed from a display card that has a vacuum-formed acetate display cover. The tins feed by gravity to a die-cut opening at the bottom of the plastic cover. Vacuum-formed or pressure-formed plastics, of course, have all sorts of applications and potential applications as contoured containers that protect, display and perhaps dispense the product. A significant development has been the introduction of a pressure-formed container adopted by Carvel Hall for a line of fine cutlery. The container consists of a sheet of paperboard heat sealed between two sheets of vinyl. The simulated leather effect of this container plus the contoured interior platform will scarcely surprise packagers who have kept their eyes on developments in formed plastics, but the combination of paperboard and plastic plus the fact that a pin-type hinge is put in during the forming operation will suggest startling opportunities for numerous other packaging applications.

Methods

The new methods the packager now has at his command are as varied as are the new materials and packages he finds around him. He can package in big, economy sizes or turn to unit, fractional or multiple packages. Thus he can reach many different outlets and markets. A 16-oz. aerosol can of Snow has been introduced, because customers have learned to use this material for a greater variety of decorative purposes. Aerosols are also going into 4-oz. cans and other small containers, partly because the smaller sizes are appropriate for certain products and so that the aerosol won't crowd itself out of the medicine cabinet.

The beer and soft-drink packagers have turned to greater variety in the number of sizes packaged. Evidently the merchandising advantage of covering and penetrating the market better outweighs the disadvantages from the standpoint of inventory and production.

The carry-carton continues to invade new product fields. Its use is soundly premised on the trend to one-stop shopping and the customer's willingness to take home a week's supply at a time. Three-unit and six-unit carriers predominate, but there may be real opportunities to sell a case of goods at a time, as is already done to a limited extent in certain instances.

Packaging in tear-strip or easy-opening shipping containers has enjoyed and deserved spectacular growth. The easy-open carton is a welcome aid to the retailer, because it saves time and effort in opening cartons, it facilitates price stamping and display. A somewhat similar move aimed at helping distributors and retailers is the accelerated interest in divisible shipping cases that can be split into quarter or half cases to serve the needs of smaller outlets. One packager uses a tear tape to divide the shipping carton into half units, but there are also specially scored and die-cut constructions.

Another intended aid for the retailer is the trend to bundling in transparent film. Not only does this method reduce weight and bulk, but it also expedites inventorying. All such built-in retailing aids merit attention, for easy-to-merchandise packages are, usually, merchandised in greater volume.

Machinery

In the final analysis machinery paces the major advances in packaging and developments in the equipment must generally keep well abreast of the demands made by the major types of materials and packages. Packages are, in general, produced at speeds comparing favorably with the high speeds at which products themselves are turned out; however, it can be expected that the influences of automation will be felt with ever greater force in all phases of production, particularly package production.

If one looks for clues, he will find them in the push-button beer lines that Anheuser-Busch recently installed and in the thousand-can-per-minute line that Heinz has installed for baby foods. Many lines, of course, will always call for improved speeds, but not superspeeds. For one thing, versatility can be just as important as speed and usually the packager has to make concessions in one category to get advantages in the other.

Perhaps most important will be the progress made in mechanizing some of the still unfilled gaps in automatic operations. A good example of this is a new case packer developed for frozen foods. This step in production remained a bottleneck because frozen-food cartons tend to bulge after they are filled. Success of the new caser is attributed to two features. First is an elevator assembly-rack system, which gathers each tier of cartons in ready-to-case patterns. Second, is a case-loading tube made up of spring-loaded finger plates that give slightly to accommodate minor variations in package size.

Similar examples of machines that are helping to make package production all automatic are the machines that apply cellulose bands, vacuum-forming machines that operate on an automatic cycle and machines developed to meet some of the newer demands such as mechanized loading of can and bottle carriers.

Merchandising techniques

The first and still the most important contribution a package can make toward the successful merchandising of a product is adequate protection of the product throughout the expected normal span of distribution and packaged use. All other merchandising considerations must be predicated on the assumption that the package will deliver the product to the consumer in a desirable condition.

Other factors, such as obtaining outlets, commanding display space and having a package with automatic sales features, may appear more immediately pressing, but let salesmen, distributors or customers report that the package is failing to protect the product and the problem is as serious as failure of the product itself.

On the other hand, once the adequacy of package protection is established, the merchandiser is free to concentrate on the competitive aspects of distribution and selling as they affect his package.

Merchandising features

A package to be an effective merchandising instrument must clearly identify brand and/or product. At the same time it must be so constructed and designed that it will perform one or more of the following functions: arrest attention, stimulate buying impulses, facilitate satisfying product use and encourage repeat sales.

The basic merchandising considerations that must be taken into account in planning and developing a package start with a study and analysis of the product itself.

A product tends to fall into one of two classes: it tends toward either a specialty or a commodity classification. This is significant in view of today's mass-distribution and self-service trends. The more successful the product, the more it tends to become a commodity and, in doing so, it also tends to lose its distinctiveness. Aspirin tablets are a good example of a product which became so well accepted that competition grew rife. Yet witness the phenomenal sales success recorded by one manufacturer who brought out a children's aspirin and thus succeeded in making his product distinctive.

However, it is not always practical or possible to have a unique product. Brand X peas may differ little from Brand Y. Obviously, therefore, one of the strongest means of assuring product individuality lies in a distinctive, effective package—one which lends itself to irresistible sales appeal or undeviating patronage.

Two significant conclusions stand out when it is recognized that the package offers one of the surest and most expeditious routes to success in merchandising.

1. The means at hand for achieving package superiority are many and their application is limited only by human ingenuity. The success stories of products, new and old, that have moved to the top or nearer the top by improving the package or adopting a new package form are too numerous and too well known to leave any doubt remaining on that score.

It would be difficult to find a single packaging material that through some new application in recent years has not helped boost a product to new sales heights—for example, foil as a label for a household cleanser, polyethylene in the squeeze bottle for deodorants, glass in the one-trip beverage bottle, metal in the aerosol can for insecticides and shave creams.

2. The packaged product that is not subject to a continuing program aimed at packaging improvement is only standing still and is, in effect, inviting competition to catch up with or outdistance it. Since most companies merchandise more than one style or kind of product, it must be recognized, too, that the continuing program of package improvement for a family line of products offers special



PHOTO COURTESY AMERICAN BACK MERCHANDISERS INST.

Character heroes and packages are a terrific merchandising team. The popularity of the hero may change, but the package as a "selling stage" for each new idol is always ready; always potent.

The retailer's good will is so important today that package features to help him are specially prized by the product manufacturer. That's why easy-opening tapes on shipping cartons are so common and so popular.



PHOTO COURTESY OWENS-ILLINOIS GLASS CO.

challenges and opportunities where a group is concerned.[1]

Other factors

The merchandiser's contributions to the planning and development of a package are influenced by practical though often intangible considerations. The merchandiser and the packager must apply those which have the most direct bearing on the potential success of the package.

That many of these factors will appear to be in conflict can be taken for granted. It can also be assumed that many factors in seeming conflict can be adjusted. A case in point was the introduction of Bufferin into supermarkets. Packaged in a glass vial and cartoned, the product presented a highly "ethical" appearance that contributed to the essential distinctiveness of the packaged product. But because of the exacting requirements of the supermarkets[2] and other "open display" types of outlets, the Bufferin packages, displayed vertically, were at a disadvantage. The usual allowable two or three facings involved space too limited for effective display and the horizontal lettering on the package was too condensed to be seen at any reasonable distance, especially since supermarkets need packages that will "sing" across the space of at least one aisle.

The solution to this problem was found not in sacrificing the ethical appearance of the package but by printing the Bufferin name lengthwise across the carton and displaying the carton on its side instead of its end. Large, bold lettering became possible and the lengthwise display of the carton meant greater facing space.

An entire field of study greets the packager when it comes to the question of size. Here again is a packaging factor that can critically influence the success of the merchandise. The key question is "How big should the package be?" A good answer to this lies in still another question: "How much of the product can the consumer use most economically and conveniently?"

For example, a manufacturer when considering the introduction of a "large economy size" tube of toothpaste determined that a 2.6-oz. quantity would provide toothpaste for 70 brushings and would thus last a month for one person, two weeks for a family of two and one week for a family of four. Although there had been some hesitation in introducing the larger size, it was reasoned that smaller tubes might not be meeting the convenient replacement needs of many families. Therefore, the larger tube was introduced and proved an immediate success. The result was well predicated: first, on a buyer need that had not been previously exploited and, second, on the very substantial economy made possible by the larger unit, which was passed on to the customer.

A similar approach to the problem of unit size has been successfully handled by the development of the multiple and the fractional package. Both mean fewer shopping trips and so have found favor with buyers. At the opposite end of the scale are the smaller unit-of-use packages which also have enjoyed increasing success because they answer a different kind of buyer need.

Special techniques

In recent years there has been a growing awareness that a *science* of packaging has developed. Moreover, it is now well accepted that the packaging committee, coordinating all the factors that must be considered, is probably the best tool available to management in making use of the scientific techniques of packaging.

An important consideration, of course, is the question of maneuverability. The packaging organization that is set up to coordinate both the policy function, which is slower, and the operating function, which must often be swift, is the group best designed to keep moving.

Today's packaging, of course, frequently calls for the ability to take fast action as well as for a delicate sense of timing.

In this connection, there is the classic example of the race to bring out antihistamine products several years ago. One manufacturer, through a judicious selection of a catch-book type of package, was able to achieve production of 10 million packages per shift—almost overnight. Most packaging operations would never require such haste, but the factor of flexibility still remains because of the opportunities that seasonal promotions, "deals," premiums, sampling and similar approaches or devices offer in today's competition. Judging from the many examples now current, the special promotion employing some unusual packaging feature will be the spearhead of more and more merchandising programs.

Testing package appeal. The evaluation of a package's merchandising potentials naturally becomes more vital in the eyes of management with every increase in responsibility that may be placed on the package.[3]

Dealer convenience

No less important than consumer acceptance of the package is the reception given it by distributor and retailer. The effectively labeled shipping container that is easy to store, open and handle for stock is an excellent ambassador of good will. The "awkward" package, on the other hand, can actively discourage acceptance. Excellent recent examples of shipping cases designed to make the retailer's job easier are a divisible case, which readily divides into smaller units, and the corrugated carton equipped with a tear tape for easier, safer opening.

The dealer, of course, is an excellent source of information in regard to the performance of the consumer package. Not only is he increasingly aware of the package's status as a sales instrument, but he is also in frequent personal contact with distributors and salesmen. Thus a direct line of communication is always open to bring his point of view back to those who are responsible for merchandising programs. If the retailer's point of view regarding the merits of the package is regularly sought and if this information is considered in the planning or overhaul of a container, the result is sure to be a better-selling package and one that will be kept current with any significant changes in buying trends.

Summary

Careful attention to package details has played an important part in helping today's best sellers attain and preserve their customer acceptance. There is no better way to avoid "package halitosis" (and even your best customers won't tell you) than to make sure your packages are neatly labeled, that they appear clean, intact and untampered with.

[1] See "Ann Page: 4th Generation," MODERN PACKAGING, Oct., 1952, p. 110, and "Recut Diamond," MODERN PACKAGING, Feb., 1953, p. 102.

[2] See "The Rack Jobber's Viewpoint," MODERN PACKAGING, July, 1953, p. 81, and "Considerations of Shelf Display," MODERN PACKAGING, July, 1954, p. 87.

[3] See "How Do You Test Package Design?" MODERN PACKAGING, Feb., 1955, p. 83.

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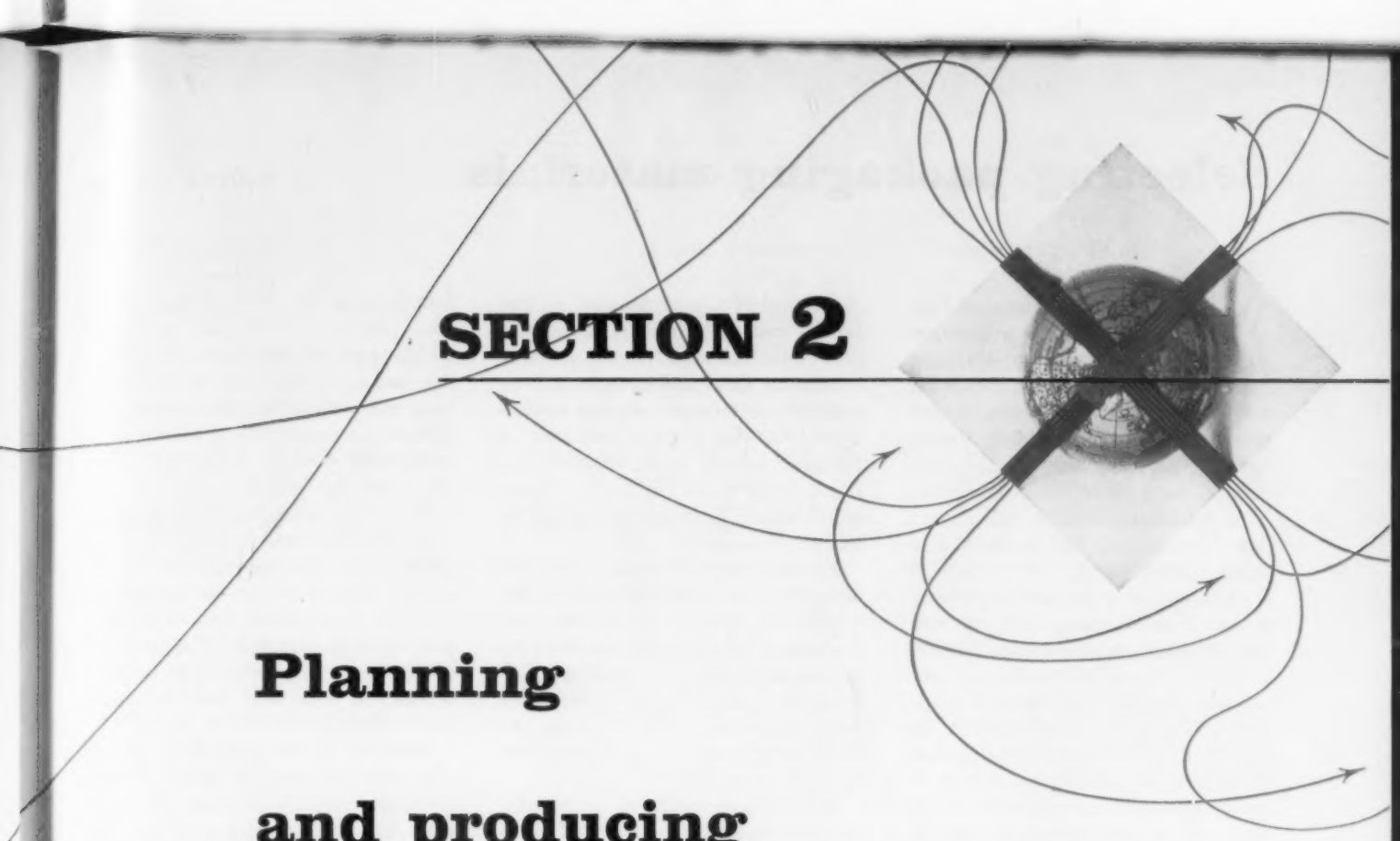
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Selecting packaging materials

by MILTON YEZEK*

Whether a business is small or large makes little difference in choosing materials for a package—the same basic principles apply. It is imperative that all the various functions of a business be consulted in building a package. The merchandising group (advertising, sales and art) must contribute basic information which will have a direct bearing on the problem. Purchasing must supply information on availability, price and delivery of materials. Manufacturing and engineering departments are responsible for specifying types of packaging machinery, speeds and labor requirements. The technical or research department must determine the product characteristics, identify possible packaging materials and evaluate these materials by established procedures. The accounting department should supply cost estimates. (See "Package Development Chart," p. 481.)

In the accompanying check list is a summation of functions involved in the choice of a package and the materials from which it is made and points at which each function can contribute to this choice. It is not intended to recommend any one method by which the various functions of business should work together but rather to set forth the various factors which should be considered in the selection of materials.

In most instances it is a complex assignment to define or identify materials for proper protection and maintain a balance with the other important requisites of a package. Sufficient tools are available to do the job, but it requires careful planning and full knowledge of the product and the materials available.

Water-vapor condition or requirement. Control of moisture and water vapor is one of the most important factors to consider in packaging. This is reflected in the tremendous amount of work done in recent years on the study of water-vapor-transmission properties of numerous materials.

Control of the moisture content of a product begins at the time of manufacture or at the time of packaging. The product should be packaged within specified tolerances. After that, the packaging materials take over to keep the product within moisture tolerances consistent with a satisfactory, marketable product during the shelf life established for that product. Finally, in the packaging of many products, moisture protection must be supplied after the package has been opened and stored on the household shelf for subsequent use. Once the product is packaged, it is the function of the packaging materials to keep it within the prescribed moisture limits for its entire shelf life.

Products which require moisture protection fall into two general classifications: dry products and wet products. Examples of dry products are breakfast cereals, prepared cake mixes, dried milk powders and saltine crackers. The moisture-protective barrier or barriers must prevent absorption of too much moisture by the product. In the case of wet products, the moisture-protective barrier must prevent the product from drying out in dry-storage

* Manager of Research & Quality Control, Carton & Container Div., General Foods Corp., Battle Creek, Mich.



PHOTO COURTESY THWING-ALBERT INSTRUMENT CO.

The internal tear resistance of a sample of polyethylene-coated kraft is here measured on Elmendorf tearing tester.

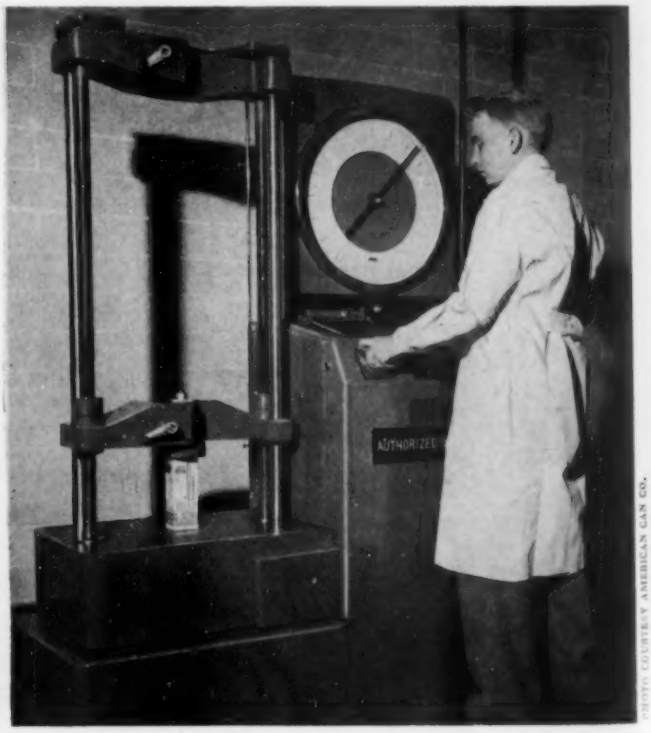


PHOTO COURTESY AMERICAN CAN CO.

A technician is making a vertical compression test as part of continuing research program on paper milk containers.

CHECK LIST OF FACTORS TO BE CONSIDERED IN SELECTING PACKAGE MATERIALS

Technical department	*Sales & merchandising department*	*Manufacturing department*
1. What are the product characteristics? 2. What type of materials will do the job? 3. What materials will withstand handling? 4. What materials will adequately protect the product? 5. What materials will be best suited to type of art work required?	1. What type or types of packages should be considered? 2. What is net weight or content? 3. Will contents be used at one time? 4. Will easy opening and reclosure devices be required for interval use? 5. What type of distribution will be used in marketing product? 6. What type of art work is required? 7. What is expected shelf life?	1. What types of machinery are available and what type will be used? 2. What are anticipated speeds of production? 3. What type of storage will be used? 4. What is maximum spoilage of materials that can be tolerated? 5. What packaging-line efficiencies must be maintained?

Purchasing department	*Accounting department*	*Suppliers*
1. What materials are available? 2. What are delivery times on materials? 3. What are prices of materials? 4. What is the outlook—short and long term?	1. What are cost estimates for various types of packages under consideration?	1. What are the limitations of various materials available? 2. What are the characteristics of materials available? 3. Can available materials be changed to meet requirements?

conditions or from absorbing more moisture in moist storage conditions. Considerations in packaging both types of product follow:

Ratio of area of packaging materials to weight of product. The packaging of various-size packages of breakfast cereals exemplifies the need to consider the ratio of area of packaging materials to weight of product. Better protective materials are required for packaging a 1-oz. serving of cereal than are required for packaging 8 oz. of the same cereal to attain equal protection. Another way of putting this—if the same basic materials are used for packaging 8 oz. and 1 oz. of the same cereal, the shelf life of the larger quantity will be much greater than that of the smaller.

Critical moisture level or "Index of Failure" level of product. The critical moisture level of a dry product must be known to those developing a package. The critical moisture level of a product may be defined as the moisture content of a product beyond which the product is unsalable. In some instances the critical moisture level may be determined by that point at which the product begins to cake. With products that cake, it is sometimes advisable to test caking properties at different temperatures to learn whether temperature change will aggravate caking. Studies made of temperature changes encountered in normal distribution show that it is not unusual to attain temperatures as high as 125 deg. F. in some warehouses and freight cars during summer months. Therefore, it would be wise to test caking properties from 70 through 125 deg. F.

Hygroscopicity of product. A dry or low-moisture product which is relatively non-hygroscopic is less difficult to package than a hygroscopic product. One of the best tools to use in measuring the humectant properties of a product is the moisture-equilibrium curve. Two curves are illustrated in Fig. 1. Curve A illustrates a product which is fairly simple to protect against moisture. Curve B illustrates a product which requires materials with good moisture-protective properties.

Other criteria for judging the critical moisture level of a dry product may be toughness, unsatisfactory flavor and unsatisfactory odor. The levels at which such changes occur are established by organoleptic tests.

Shelf life. A clear definition of the expected shelf life of the product is imperative in building a package for satisfactory moisture protection. This will help prevent the product from being protected too well or too little.

Handling of packaged product. The type of shipment and distribution the product will receive is an important consideration in designing a package for suitable moisture protection, because the manner in which the moisture barriers withstand this handling may very well determine the materials to be used. Some packaging materials become embrittled when their moisture content is reduced through drying out by the product or by storage in low-humidity areas. If distribution involves severe handling, the embrittled barrier will tend to shatter or break and the moisture-protective properties of the barrier will become so impaired that it will not protect the product adequately. This same barrier in laboratory testing may be found to be quite adequate protection.

Moisture protection of wet products. Typical products which fall into this classification are bread, dried fruits such as raisins and prunes, meats and frozen foods. The function of the moisture-protection barrier or barriers is to prevent the product from becoming desiccated or, occasionally, from absorbing additional moisture. These products must be kept within a certain moisture range consistent with the requirements of a salable product.

In choosing moisture-protective materials for wet products, four primary factors must be borne in mind: Ratio of area of package materials to weight of product; minimum and maximum moisture content consistent with a salable product; shelf life of product, and handling of packaged product.

The considerations for each of these

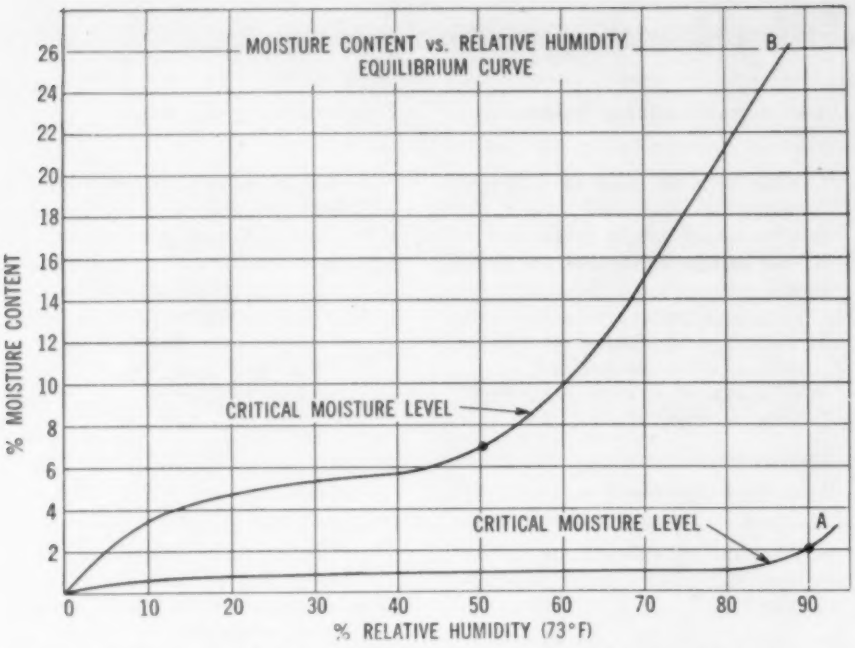


Fig. 1—Moisture equilibrium curves are shown (A) for a product that is easy to protect against moisture and (B) for a product that requires good moisture protection. Improper packaging for type-B products can cause serious losses.

factors are similar to those for dry products. Usually the ratio of the surface area of packaging materials to weight of product is not so critical for wet products as for dry products because the density of wet products is usually high.

As pointed out, the function of the moisture-protective barrier is to prevent the product from absorbing moisture from the atmosphere, that is, to prevent moisture outside the package from getting inside. With wet products, in most instances the moisture-protective barrier is asked to prevent moisture inside the package from going to the atmosphere. This being the case, it is important to know the minimum and maxmum tolerable moisture content for the product.

Moisture protection during product use. Many products require moisture protection after the package has been opened. Usually the length of time the package is held once it is opened is relatively short in proportion to its total shelf life. Nevertheless, it is important for products to be protected against moisture absorption or loss during this period. It is here that a sound reclosure feature has great merit. Some packagers are circumventing the reclosure problem by the use of so-called fractional packages—several individual units packaged as one. This usually means higher packaging costs per unit.

Protection against light. Many products require full or partial protection against light. Foils, opaque papers, metal cans and colored glass can be specified according to needs. One of the most light-sensitive products packaged today is photographic film. The extent or degree of exposure to light must be under maximum control during both packaging and distribution. Colored packaging materials for filtering light have been of aid in reducing rancidity in potato chips. A packager of bacon developed an ingenious opaque package with a flap-covered window. The product is protected from light rays, yet shoppers can lift the flap and see the bacon—a prerogative which is not relinquished lightly.

Insect infestation. Certain products are highly susceptible to insect infestation. Cereals and cellulose products are two such types. The control of infestation begins in the plant and extends through distribution channels. Modern insect-control methods have made it possible largely to eliminate the problem during manufacture. In respect to distribution, the best way to combat infestation is to design a package which wards off insects.[1] Control of age of stocks has been found an aid in minimizing insect infestation.

The use of insecticide-treated packaging materials for reducing infestation has met with some success. Flour bags made from paper treated with formulations of piperonyl-butoxide and pyrethrines reduce infestation.

Thermal, barometric or humidity changes. In the packaging and distribution of frozen foods the control of temperature is, of course, paramount. In warehouse and retail channels, temperature control is particularly important. The packaging materials used must possess adequate flexibility at these low temperatures, so that, where overwrapped cartons are used, the coatings applied to the over-wraps must possess good seal strength under cold-storage conditions—a common failure point.

Pilferage and tampering. Most packages lend themselves to prevention of pilfering. Containers with screw lids (mostly glass bottles and jars) are most susceptible to tampering. For bottles, the common method of solving this problem is to use some type of secondary closure—cellulose seals, foil bands or glassine tamperproof seals. Paper—usually glassine—and plastic lids can be glued to tops of jars to make them tamperproof.

Bacteria. Products which are subject to bacterial action must be handled and processed with care before and during packaging. The package must be designed to arrest further bacterial action after packaging. In most instances the package should be of such construction that it can withstand processing conditions, particularly high temperatures and humidity. For this reason metal and glass containers are generally used for products susceptible to bacteria.

Mold. Cheeses are probably the most critical of food products in respect to mold.[2] Cold temperatures help control mold development of such products. The exclusion of air or oxygen from cheeses is important in abating mold growth; therefore it is necessary to use packaging materials possessing low gas-transmission rates.

Foreign odors. There can be little assurance in modern methods of distribution that a product which tends to absorb odors will not be stored near an odoriferous product. In packaging such products it is important to use materials having low gas-transmission rates—glass bottles, metal cans, foil and laminated or coated stocks.

Odor loss. Here, again, materials

[1] See "Insect Penetration of Film," MODERN PACKAGING, April, 1955, p. 216.

[2] See "An Effective Mold Inhibitor," MODERN PACKAGING, May, 1955, p. 127.

with low gas-transmission rates are necessary for packaging products subject to odor losses.

Chemical reactions between product and container. Some foods are high in chemical activity. Many canned vegetables will react with unlined metal cans and become unpalatable, so that care must be used in selecting the proper lining to prevent this. On the other hand, with products such as tomatoes it is necessary to use tinplate for canisters, since these products will attack linings.

Oxygen. The presence of oxygen in contact with foodstuffs can present varied and serious problems. Elimination of oxygen in packages of roasted coffee, fats, oils and dried whole milk will appreciably extend shelf life. Accordingly, excellent gas barriers such as metal and glass, are often used for such products. Oxygen can cause development of off flavors and odors due to "browning" and rancidity.

Odor of packaging materials. There are packaged products which may absorb packaging material odors. Careful choice must be made of materials to package such products. Carton board, ink, solvent and chemical odors are common odors that are troublesome.

This list of hazards that packaged products face is not intended to be all-inclusive. These hazards, for the most part, are the more serious types. No

Check List of Product-Packaging Characteristics

The following check points are suggested for various product types. The list is admittedly incomplete. Specialists in the various product groups can point out the relative importance of each characteristic and also add many others. Comments in parentheses explain the reason for testing for certain of the packaging characteristics.

I. Foods, dry flowable
- A. Equilibrium humidity
- B. Freeness of fats
- C. Index of failure
  1. Moisture
  2. Oxygen
  3. Temperature
  4. Volatile components (flavors, CO_2, etc.)
- D. Static (useful for filling and closing equipment)
- E. Flowability (useful for filling and closing equipment)
- F. Abrasiveness
- G. Chemical activity (interaction with the package)
- H. Bulk density

II. Foods, damp or nonflowable
- A. Freeness of water
- B. Freeness of fats
- C. Equilibrium humidity
- D. Index of failure
  1. Moisture
  2. Oxygen
  3. Temperature
  4. Volatile components
- E. Plasticity
- F. Chemical activity
- G. Bulk density

III. Foods, frozen
- A. Index of failure
  1. Moisture
  2. Oxygen
  3. Temperature

IV. Foods, fresh produce
- A. Humidity requirements
- B. Index of failure
  1. Moisture
  2. Oxygen and other gases
  3. Temperature

V. Chemicals, dry flowable
- A. Equilibrium humidity
- B. Index of failure
  1. Moisture
  2. Oxygen and other gases
  3. Temperature
  4. Volatiles
- C. Flowability
- D. Static
- E. Abrasiveness
- F. Chemical activity
- G. Bulk density

VI. Metal and electrical products, etc.
- A. Freeness of coatings (durability and oiliness of anticorrosive coatings)
- B. "Dryness" of surface finishes (resistance to adhesion between the package and product finishes)
- C. Index of failure
  1. Moisture
  2. Oxygen
  3. pH and specific agents
- D. Abrasiveness (of metal surface of finishes)
- E. Humidity and temperature as related to corrosion
- F. Chemical activity (electrolytic effects between product and package)

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one product is subject to all of them, but practically all products will face one or more.

Other considerations

The selection of materials for a package should incorporate proper "balance" with respect to protection, sales appeal, cost and handling. The judgment of proper balance can be a problem. Ideally, a package is chosen which will provide adequate protection at low cost, will have proper handling characteristics and will have adequate sales appeal. What would be the effect on sales and on building a franchise of choosing a package slightly higher in cost to attain higher sales appeal and maintain protection and handling characteristics? Slightly higher packaging costs are sometimes well worth the expenditure. A case in point is that of a nationally distributed cleansing powder. The package used for the product is a fibre-bodied canister which has an attractively printed aluminum-foil label. Before the new label was introduced, the product was well down the line in sales volume. Introduction of the more attractive package with better protection and functional features caused sales to increase at a rapid rate and the high sales volume was maintained. The bright appearance of the package and the water resistance of the label during use are probably the chief factors in the success of this package.

Final selection of materials

Laboratory testing of packaging materials has developed into a fairly accurate science. Most materials can be screened in the laboratory and rated as acceptable or unacceptable for a given product. This does not imply that there is no need for improved laboratory testing. There is a definite need for better methods. However, test methods over the past several years have been sufficiently refined so that they do a fair job. Drop, incline-impact, vibration, high temperature and humidity, low temperature, greaseproofness and impact-fatigue tests are some examples of useful tools in rating materials.

Wherever there are two or more alternative materials that seemingly can be used, actual shipments through normal distribution channels to several areas of different climatic conditions should be made. Slight differences in materials often are uncovered through this type of testing.

Planning efficient lines

by GUSTAV WINCKELMANN*

Packaging occupies a unique position in being a vital part of production as well as an equally important distribution-merchandising vehicle in the over-all operation of a business. As part of production, packaging shares the problems of manufacturing; that is, accent is on output, quality, mechanization and efficiency.

The packaging line has one major objective—to produce the volume and quality demanded by sales at the most economical cost. And just as sales volume works back to influence the efficient output schedule of the production line, so does economical production work forward to help determine the competitive merchandising position of the product. This relationship is self-cycling, for gains in production economy place the manufacturer in a better position to win and hold customers and a healthy sales volume helps stimulate emphasis on more efficient production.

The first prerequisite of effective package production is proper planning and selection of the package itself. Maximum output and quality can be expected only where the package form and its component materials have been judiciously selected and where specifications and proper handling assure delivery of uniformly workable packaging supplies to fillers, cappers, labelers and other equipment.

There are myriad ways to achieve efficiency on the packaging line and often these are so interrelated that the rewards (or penalties) are cumulative. Thus a good layout makes for efficient handling, permits the use of high-speed equipment, contributes to good housekeeping and safety and may permit more flexible operations—all of which can be impossible if the layout is poor. Therefore, one of the first considerations in package production is choice and use of the packaging area, which in turn is part of the over-all manufacturing-processing layout problem.

Production methods

Methods of packaging run the gamut from completely manual to fully automatic. The two extremes in production are rare and most operations fall somewhere between.

Manual operations are usually found in association with a new product and package in its infancy or a costly non-competitive product.

The need for automatic production arises when a product has been proved and publicly accepted in competition with similar products. From this point on the search for improved methods is spurred by many other factors. Foremost is the need to assure prompt delivery of a quality product and to produce this product as economically as possible in the face of constantly rising labor and material costs; in addition, to have on tap the reserve in production necessary to meet increased demand or seasonal fluctuations; and finally to keep informed of the special devices and materials that provide the packaging improvements necessary to meet today's exacting quality requirements.

A successful packager needs a sense of timing and balance. For example, a company was combing a list of the manufacturers of labeling machinery to purchase machines having double the capacity of its already high-speed equipment. Such machines can of course be developed at extremely high manufacturing costs—but what of all the other machines in the line? They, too, would have to be replaced with machines of correspondingly higher speeds to maintain complete balance. And, of equal importance, the other departments in the plant would then be out of balance. Processing and product preparation, supplies and materials receiving and storage, finished product handling and shipping would have to be enlarged to service the new machines.

The savings in this case would have been a mere fraction of the cost of the finished product. The capital investment would have been enormous and could not have been liquidated, for there was not enough sales demand.

On the other hand, a well-known packager of beverage spirits operating two plants in widely separated cities produced in each plant several brands in miniature bottles in limited quantities. These packages were produced on semi-automatic lines at very high cost. Yet the volume at each plant could not justify installation of the improved packaging machines available. However, when the production of both plants was combined and fully automatic equipment installed, savings were beyond all expectations. The quality of the package improved, deliveries were more promptly made.



New streamlined layout and high-speed packaging equipment speed production and reduce costs on line packaging snack items.

* Winckelmann Associates, Baltimore, Md. Formerly with Frankfort Distillers Corp.

Slightly higher freight rates on some of the more distant shipments proved inconsequential and did little to detract from the savings.

Many such opportunities may exist within a single plant, for today the products of most packagers are diversified. With minor changes, equipment used to handle one product will readily package a second or a third and the combined output will frequently justify the installation of improved machinery that will show savings and an improved package.

In an effort to have a distinctive package some producers add an exclusive feature to their package design requiring manual processes for which there is no available automatic or machine operation. To meet this problem, the production manager must constantly search his own and other fields for methods and machines or devices that can be adapted to his needs. For example, a machine used with great success to apply labels on tapered jelly glasses and narrow neck bands on bottles of chili sauce was improved and equipped with a spotting device to become one of the most satisfactory machines for applying a very wide foil neck label completely around the necks of liquor bottles. It did the work of 15 trained manual operators with far greater uniformity, requiring but two operators for the entire job.

Care must be exercised in the establishment of methods and selection of machinery. The new method or machine must fill a need and justify its purchase within a relatively short period. It should make a definite improvement in package quality and uniformity, should have the flexibility to handle new shapes and sizes.

Producing at a saving is always foremost in the packager's mind but should never preclude the testing and adoption of the new packages that are being developed.

Production scheduling

From the standpoint of the production unit, what set of circumstances would constitute perfection? It can be stated very simply—"The same and unchanging volume day after day." There are very few packagers who have ever produced with such uniformity and if so, it was probably artificially contrived.

During World War II some packagers had their entire product inventory on hand in the warehouse. This was particularly true of liquor companies, because the Government had banned all distillation except that required for war purposes. The type of package was prescribed by law, as was the number of employees and their working hours. These packagers took a look at their inventories, made a conservative estimate as to the duration of the war, divided the time into the inventory and found a production figure for the next several years.

Normally, production scheduling is much more involved, especially with seasonal products or where you have unexpected peaks and valleys. However, the aim is always the same—to deliver to the ultimate consumer, as required, a quality and uniform product properly packaged and protected.

To do this requires close coordination with every department of the organization. First of all, the sales department is called upon to provide a forecast of demand for the periods under consideration. These figures in most cases are a rough guide, very often the product of wishful thinking, for actual sales have a habit of either exceeding or falling short of the forecast. If sales should go higher than the forecast, management would be greatly disturbed had the production department failed to make allowances for this possibility. Should the sales not develop, then the production department must "shorten sail" to prevent unwieldy build-up of raw materials and supply inventories or finished-product storage.

It becomes obvious that production must function closely with purchasing to keep the movement of materials and supplies smooth and flexible as to date of delivery.

The foregoing problems are long range and general. They apply to almost all plants, at least in part. There are, in addition, problems that must be solved because of the nature of the product.

Packagers of fresh food products have a seasonal production consideration that would leave others unfamiliar with this type of packaging breathless at the high tempo of the operation. Only by careful scheduling months in advance can so much be accomplished in such a short time.

Regardless of the plant or product, every effort should be made to give the production unit a reasonable length of time to schedule its operations efficiently. This time span will of necessity vary with the product, but changes made in a production schedule after the wheels have been set in motion can only result in lower efficiency and higher costs.

A sales department that continually finds areas or customers low or out of the product is simply taking orders rather than selling. It therefore should not expect or depend on the production unit to interrupt schedules to fill the void.

Production scheduling can be divided into two phases, the long range and the short term.

In the long-range phase, demand must be forecast, raw materials and supplies purchased and scheduled for delivery. New materials or packages must be tested and approved, equipment checked, overhauled or replaced, and expanded if necessary. Equally important, personnel requirements must be reviewed and training programs initiated to provide replacements, to expand the force and to allow for sick leave and vacations.

The short-term schedule is the daily or weekly schedule of actual operations, set up on forms for each department, to assure the uninterrupted flow of products from process to package to storage or to carrier.

Care should be exercised in both phases to make sure there will be no interruption in the schedule other than those required by good scheduling or minor failure of equipment.

Quality control

Quality has two sides—the inside (or product) and the outside (or package). The inside, or the product, and its control are usually the responsibility of the laboratory. How well the product is controlled, and when, can and does have a direct bearing on production efficiency.

If the plant is well designed and all possible care has been exercised in selecting equipment, particularly that portion of the equipment coming in contact with the product, the chances are remote that handling of the product will affect its quality.

Quality of product should, therefore, be determined at the earliest possible stage, even before receipt of the raw materials, by examining and testing samples of the various components and by comparison with established standards.

Final determination of the quality of the product should not be made during or after packaging, for rejection at that point can be costly and

wasteful. This does not mean that the final package should not be checked—it should—but as a test of plant operation, not product quality.

Quality is a vague term too often loosely applied. In some procedures a point of rejection is established by specifications. If acceptable, the product, material or supply can range anywhere in quality from passable to superlative. This permits too much variation in acceptable packages.

The packager should first determine a *consistently attainable* quality standard as close to perfection as is reasonable and this standard should then become an inflexible gauge by which products both over and under the standard are rejected, thus assuring the consumer *uniformly* high quality. The gauge of quality should be raised only when experience, better raw materials or a change in processing methods assures consistent uniformity at the new, higher level.

Packagers must establish standards for containers, closures, labels, glues —in fact every component used to hold and protect the product.

The testing procedure should be thorough enough to prevent so far as possible substandard materials from entering the lines, but it should not be so elaborate and cumbersome that it lags behind production, thereby losing its value.

Inspection must be carried on during the packaging operations constantly and after each separate step as well, for at today's high speeds, manual inspection at the end of the production line, immediately before casing out, may not be adequate.

Fortunately electronic mechanisms have been developed to perform certain inspection tasks and more will be developed. The packager should keep abreast of these improvements.

Cost control

Proper cost control is a tool of the packager. To be of value it must be available where needed. Too many cost reports are often just histories.

The entire operation should be studied, by department and by operations in each department, with the wholehearted cooperation of the department supervisor and employees.

Reasonable standards can then be established and forms prepared to record daily performance. As in most efficient operations, simplicity should be the keynote. There are many examples of cost-control procedures being inaugurated that require more time than is used to perform the work being controlled.

Cost control to be of value must be factual. If it is not working well, the fault lies with management—the tool is not being used properly. Too much emphasis may be placed on some one factor in the report (efficiency, for example) that implies in the minds of department supervisors a criticism of their stewardship.

The result may be that machines are gradually speeded up to operate in excess of standard, labor will be borrowed from service operations to increase direct production efficiency or production time will be charged to services for the same reason.

There is so much vital information in a factual report that every effort should be made to acquaint all department heads with its true purpose and value. Proper cost control will picture the value of each machine in the plant, will indicate the adequacy of machine maintenance, will take the guesswork out of future purchases and will quickly indicate the need for improvements in equipment. It will determine the worth of each item of supply used in the finished product and, in addition, provide a ready guide to personnel requirements for production volume.

Last but not least, if properly installed, cost control tends to keep each supervisor alert to the problems in his department and constantly searching for better methods. Lower costs and higher quality will result without the need of stressing them.

Equipment

Fortunate indeed is the packager whose experience enables him to select equipment on the basis of proved performance in his own plant. Other packagers can avail themselves of the excellent advice and services of established and dependable machinery manufacturers. As in all products and equipment, there is a best. Do not hesitate to borrow the experience of other packagers. Whenever possible, arrange visits to inspect equipment in the plant of a user—on your own.

First cost is not necessarily last cost. As in the case of automobiles, think well before buying used equipment unless study indicates that even fair performance will effect important savings.

When buying new equipment be sure that your order is complete in all details. In addition, whenever possible, qualify all contracts for machinery and equipment purchases with a "performance clause." If the manufacturer who will not accept such a clause has doubts, so should the purchaser. This clause may save many headaches if the equipment does not deliver the promised performance.

Some machines like case sealers, case compressors and certain filling machines have a relatively slow rate of travel and can be expected to have low maintenance costs. Other machines, such as bottle cleaners, cappers and labelers, require higher maintenance. Greater care should be exercised in buying them.

The manufacture of packaging machinery is still custom manufacture compared with automobiles, air compressors, pumps and the like, which are produced in large volume.

Standard packaging machines will not have the refinements that would be "standard" with higher volume. Therefore, the purchaser would do well to have refinements built into his machine regardless of the higher initial cost. Inaccessible grease and oil fittings, for example, should be extended to the outside of the machine. Castings housing shafts should be bored and bushed. Ball and roller bearings should be used when possible. Alloy materials such as Monel for shafts and rollers should be specified for parts subject to corrosion. Inaccessible cams and other castings should be split for easy replacement —and there should be as many other refinements as possible to simplify future problems.

This additional initial expenditure will be returned many, many times in lower maintenance cost and savings in lost time and production.

There are two types of "safety" to be incorporated in the machine—protection to the operators who will run the machine and protection to the machine itself to keep foreign objects out of gears and other moving parts. The list of such objects includes glues, gummy products, corrosive liquids and abrasive solids.

Perhaps no single factor affects so directly the efficiency of the plant as does maintenance or the lack of it.

To be effective, maintenance must be thorough and regular; schedules should be established and followed. Multiple duties for maintenance personnel are very often false economy.

If production schedules do not per-

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mit down time for overhauling, stand-by equipment is sometimes necessary for use while worn machines are being overhauled.

The package in production

Imagine if you will a plant producing as follows—a single product, preferably a liquid, packaged in a single container, preferably a glass or metal cylinder, closed with a simple closure, packed automatically in a standard case and conveyed directly to rail or motor carrier. This is a basic plant and every item added increases the problems of production.

Granted that there are very few plants operating so simply (the carbonated beverage bottler has made a close approach), each step in the opposite direction should be weighed.

The packager who now finds his types of packages numbering in the dozens would do well to devote weeks, if necessary, to find out how closely he can approach the basic plant; a slight change will sometimes work wonders in simplification.

In manual or semi-automatic operations, variation in closures, labels, shapes and other package parts or decorations do not present the problems they do at higher speeds and in fully automatic operations.

Standardization will quite noticeably improve the efficiency of the packaging line, as has been proved many times. It will also simplify container and supply inventory problems, which will in most cases effect a saving in space equivalent to the addition of hundreds of square feet.

If a packager hesitates to simplify and standardize his package, he would do well to study the packages of some of the leading brands in the beverage spirits, pharmaceutical or food industries, where standardization has permitted the installation of truly remarkable high-efficiency lines.

Cost reports will indicate the best packaging performance. Use these as a yardstick or a guide to determine which package features lend themselves to economical operations and try to incorporate these factors where practical in all other packages.

In conclusion, to assure top efficiency in the line, it would be well for any packager to take a good look at his over-all picture (not, for example, his packaging line alone). He may be surprised to find that minor changes will make for greater efficiency and considerable savings.

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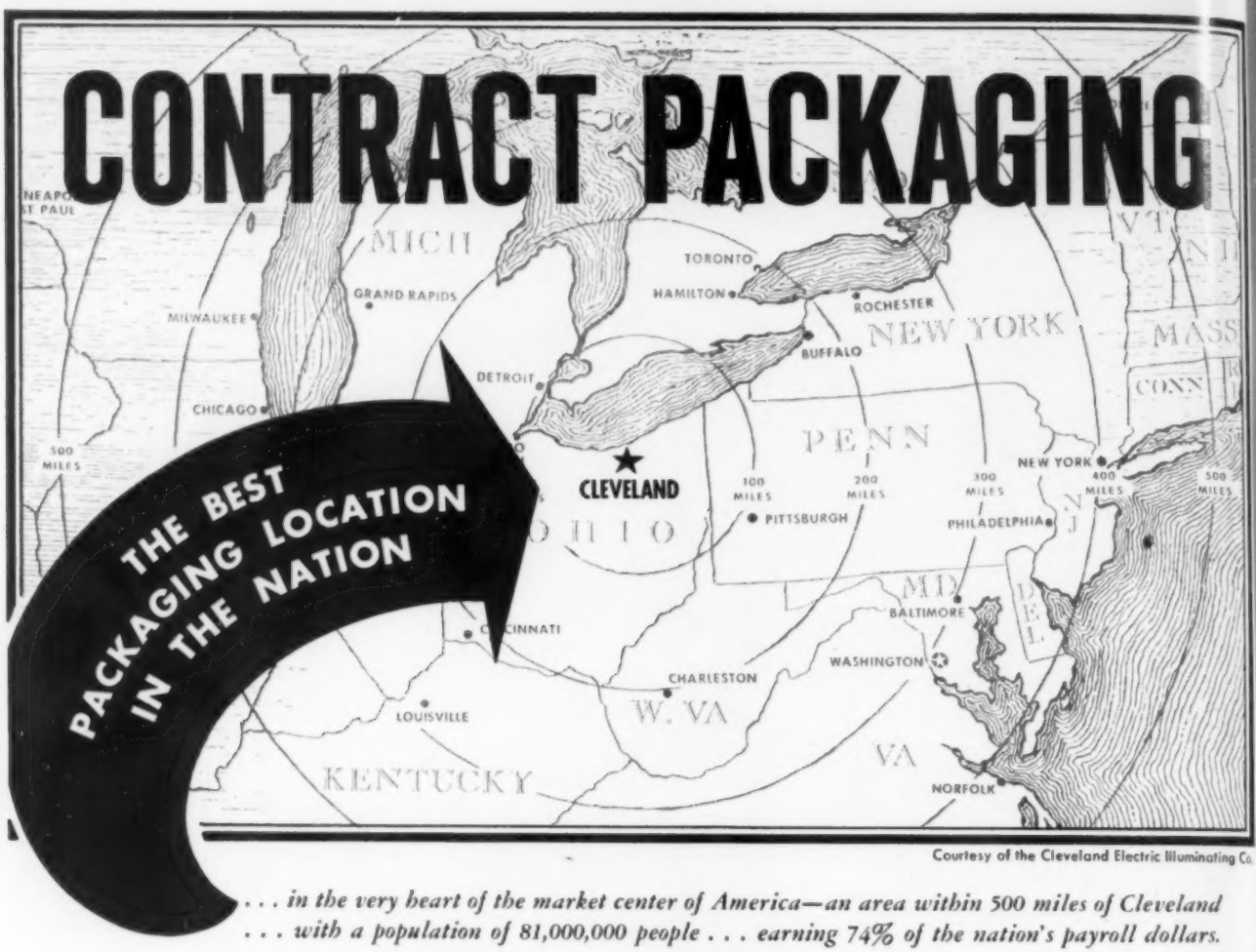
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. . . in the very heart of the market center of America—an area within 500 miles of Cleveland . . . with a population of 81,000,000 people . . . earning 74% of the nation's payroll dollars.

COMPLETE CONTRACT PACKAGING FACILITIES *ready* TO SERVE YOUR PACKAGING NEEDS

Whatever your packaging requirements, we can be of service to you . . .

- **Centralized packaging to reduce freight costs on distribution to eastern and mid-western markets.**
- **Packaging for special promotions or sampling.**
- **Packaging for peak-season requirements.**
- **Packaging to provide a second source of supply.**
- **Pilot-line packaging tests.**
- **Taking over your entire packaging and distribution operations to relieve you of excessive packaging and transportation costs.**

Since 1934 we've specialized in contract packaging and we are providing efficient, economical custom packaging service for scores of companies, large and small. Our personnel is fully experienced in all types of packaging. Our compounding and packaging equipment is modern, high speed and efficient. We have a new, modern plant with complete warehousing and shipping facilities. We are meticulous with inventory records and insurance coverage on client's goods.

We'd be more than happy to discuss your packaging requirements and submit an estimate in the form of a unit price—each package complete, packed and ready for shipment. Your inquiry is cordially invited.

PRODUCTS PACKAGING, Inc.
BOX 1076, STATION "A", CLEVELAND 2, OHIO

Packagers of automotive and household chemical-specialties and insecticides. Assemblers of hardware and industrial parts.

Packaging in bottles, metal or fibre cans, bags, envelopes, tubes —sizes from a fraction of an ounce to 5 gal. or several pounds.

Custom services

The producer of packaged products finds at his disposal today[1] a number of highly important services, ready and equipped to aid in the preparatory and production operations of launching and distributing his goods.[1] Even the largest packagers do not—or need not—rely on their own organizations for certain services of a specialized nature. In the early days of the packaged-goods era, there seemed to be only one packaging problem—that of obtaining a good design. But demands for increased protection and longer shelf life transferred the emphasis from external design to more technical problems, concerning mainly materials and their properties. It is now realized that the package is not ready for the designer until problems of material selection, sizes and shapes have been decided. And so the package technician comes early into the picture.

The package technician thinks in terms of protection, producibility and economy. He knows materials from the standpoint of their properties. He knows how to select and test package materials, in raw materials form or as a finished package. He can suggest and demonstrate changes in the composition of material to improve performance. He can conduct the tests himself or suggest laboratories to determine the fitness of a material.

The package designer, as an artist, found an important place in the field quite early in the history of packaging. He is concerned primarily with the external and visible aspects of a container. He knows colors and design from an esthetic point of view as well as from the psychological aspect of consumer reaction. Usually he has a merchandising background—he understands the force of competition and can advise whether to follow a trend or to establish a new pattern. He is familiar with dealer practices in various lines of business and in various types of outlets. He has a keen sense of display values. He knows that his art is for sales' sake.

This many-sided individual has at least a speaking acquaintance with the packaging production line and its equipment—perhaps not the intimate knowledge possessed by his colleague, the technician, but sufficient to enable him to coordinate his work with that of the technical departments.

The designer keeps abreast of legal developments. He knows what elements of information and decoration are permissible; he knows, too, what the law requires and what it prohibits.

How to combine effectively and harmoniously the various elements, required and optional, that go to make up a package design—that is the principal contribution of the designer. He can weigh the relative importance of the elements which his client insists must appear. Frequently he even has courage enough to recommend sacrifice of some of the sacred cows his client has long worshipped.

The packaging engineer should be heard from before plans have become too "jelled." It doesn't matter what title this technician has, nor whether he is an independent consultant or a permanent member of the packager's organization; he may even "double in brass" on the packaging team; but his functions must be clearly understood and efficiently performed. In the case of a new product or plant, he might well begin to function while the architect is still on the job.

One of his first jobs is concerned with plant layout and the arrangement of a production line that will perform efficiently. He has a very practical working knowledge of packaging machinery and equipment that usually grows out of an engineer's training and a production man's experience. He is qualified to select machinery for the various operations involved, to supervise its installation and to develop a maintenance program that will assure long life and steady service.

The trade association is a source on which the packager may call when in need of counsel on less tangible matters. Several of these groups hold annual package competitions. Some of them conduct what amounts to a legal department to prevent the members from becoming embroiled with the law in respect to what is required on labels and packages. Many trade associations collect production statistics for the guidance of their members.

Market analysis and research organizations prove useful to the packager before he reaches the production stage. They can measure objectively probable consumer reaction to both product and package. Some of them are equipped to inventory shelf stocks in retail outlets. Most of them are able to determine the force of sales competition. An idea of the importance of market study can be gained from the fact that some of the largest producers maintain complete and permanent departments of their own using the same field operative repeatedly.

Package research and testing labo-

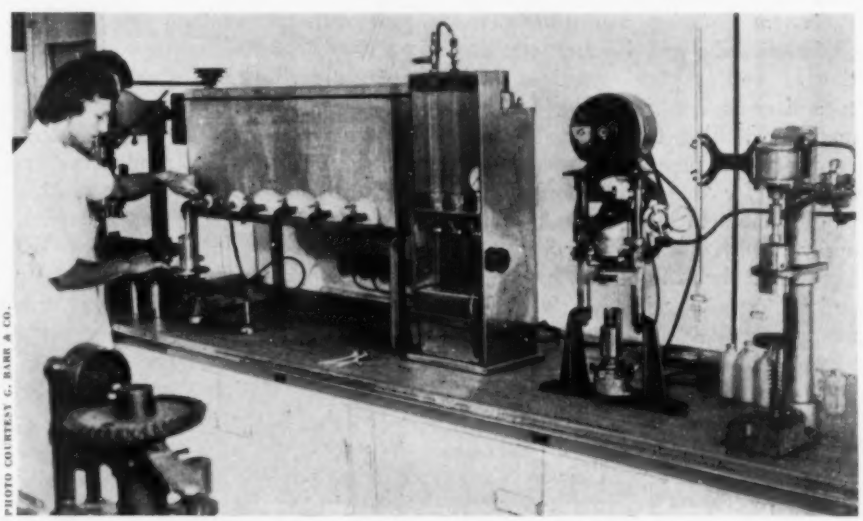


PHOTO COURTESY C. BARR & CO.

Test batches of product formulations for aerosols are filled for aging ovens in laboratory of contract filler as part of experimental production.

[1] The reader is referred to the Services Section of the Buyers' Directory at the end of this volume for firms supplying special services.

PHOTO COURTESY THE CENPRO CORP.



Line in contract packager's plant. Two-cell perforated strips are formed and filled with powdered drug.

PHOTO COURTESY A. D. FINKELSTEIN & CO., INC.



Cold storage room for handling and storage of bulk material is provided in contract packager's plant.

ratories, by means of unbiased studies, are able to show the packager how economies can be effected by testing the materials of which shipping containers are made, as well as by performing tests on the finished containers. Some of them are set up to test consumer units also. They can furnish indisputable facts regarding the adequacy of package material to resist hazards.

Package decoration, particularly the special printing or marking of glass, plastic and ceramic containers, has made great progress recently, but in most instances a package of this sort does not run to heavy volume. Here the packager utilizes the services of firms which specialize in such processes, because it profits him to have the work done by an independent plant rather than invest in equipment that will stand idle much of the time.

Custom finishing and coating includes varnish and lacquer application as well as plastic coatings used to add some quality to the package material. Skilled technicians with a knowledge of practical chemistry are required for these operations. Most label manufacturers are equipped to apply varnish and lacquer, which add lustre and help to prevent scuffing and soiling of the label surface. Numerous specialists are well qualified to apply plastic coatings.

Flocking is a specialized coating process that imparts a surface texture resembling suede, velvet or velour. Flock fibres available in many colors can be applied to paper, cloth, wood, metal, glass, plastics or ceramics. The fibres are of rayon, cotton or wool. Special equipment and trained personnel are required.

Die cutting is a service that can be performed by label, carton and display manufacturers as part of a complete production job. Occasionally, however, the need arises for a more intricate operation. Here the packager can obtain the skill of the specialist.

Custom embossing imparts a three-dimensional effect to package surfaces. It is distinctly an artistic embellishment, used to enhance the appeal of a package. It requires a wide variety of equipment, however, and involves so many technical factors that the packager can profit by seeking the specialist's services.

Custom laminating enables the packager to draw on the specialist for combinations of materials to meet out-of-the-ordinary package requirements. Highly developed "know how," coupled with greater than usual knowledge of materials, equips the laminator to perform useful services.

Display mounting and finishing is a service which only the larger lithographers and display producers perform in their own plants. When those operations are farmed out to concerns having the necessary equipment, the lithographer produces the display piece on offset sheet stock, after which it is die cut and mounted on paperboard of the desired gauge, equipped with easels, platforms, etc., ready for installation in the retail store.

Custom folding of package inserts or other advertising matter to be enclosed in the package with the product is a task that is often farmed out. The folds must be made with precision, or they will jam in the packager's production line. Although the first cost may appear to be a little higher than warranted, real economy may be served by doing the job outside.

Contract Packaging

Frequently a manufacturer or merchandiser finds it is more practical to turn all or part of his packaging operations over to a contract, custom or "private label" packager.

The contract packager is a specialist in packaging, generally in a particular type of packaging, such as the bagging of tea, capsule filling, tube filling, unit packaging, loading aerosols or export-import packaging. Usually the contract packager's equipment and know-how are geared to the operations that present special problems—small or large sizes, intermittent runs, fluctuating volume, etc.

Contract packaging has been in existence a long time and in recent years has shown important growth in size and number of establishments engaged in this work. The specialized character of contract packaging has advanced sharply in a number of directions. Plant and equipment facilities have been tailored, and in many instances expanded, to fit a range of needs. In numerous instances the contractor has helped develop new machinery, has pioneered new methods and has introduced new packages.

Even the many product manufacturers who will always find it more practical to perform their own packaging can learn important lessons

the contract operator, who necessarily must concentrate on efficient production and at a fixed price.

When to use

Contract packaging is most likely to challenge the product manufacturer's consideration when special packaging or merchandising conditions are involved. These conditions can be summarized as follows:

1. *"Area packaging"* or market coverage of areas distant from manufacturing facilities. For example, a logical consideration of contract packaging is indicated when a product manufacturer's freight costs exceed his factory operational costs. Contract-packaging service on an area basis can also provide the producer with opportunities to establish new markets in untapped geographical areas.

2. *Intermittent operations* or fluctuating loads. Contract packaging offers certain natural advantages to the manufacturer whose distribution is seasonal or cyclical, or where production is intermittent or a one-shot affair. Insecticides, plant foods, anti-freeze compounds and many similar specialties are frequently handled by a contractor, because production demand does not exist year-round. This creates problems for the producer that do not exist for the contractor, in that the latter makes a business of handling a number of fluctuating loads in a manner designed to keep his equipment going all year. Special promotions and samplings are frequently best handled by the contractor because of the problems that a sudden increase in the work load, plus temporary expansion of the work force, pose for the manufacturer. These obviously become more pressing because they come at a time when regular production may have to be at full schedule to keep pace with the increased business the promotion or sampling is designed to create.

3. *Pilot-line production* for new products. Many new ventures in packaging involve selection or development of a package, establishment of a packaging line and testing of production schedules against anticipated and actual sales results. This situation poses serious problems for the new or small company and sometimes they are equally complex for the established firm. In such cases, contract service may be a wise choice in order to avoid heavy investment in plant and equipment during the period when the product's merchandising potential is untried.

4. *Specialized packaging* for which equipment or methods must be developed or adapted or where volume does not justify special installations in the manufacturer's plant.

Examples include the filling of giant-sized tubes, unit or strip packaging and the loading of aerosols.

Performance of the unusual operation is the field in which the contractor really excels. He is apt to get the "difficult" assignment because it is the most costly and disruptive job for the manufacturer to handle.

Cost

Contract-packaging costs are only one "yardstick" against which to measure the value of this "service."

It should not be inferred that a contract packager's costs will always be lower. Frequently they will be higher. But in that circumstance it may be wise, in some cases, to use contract packaging because of intangible gains, such as the benefit of having a second source of supply, more rapid delivery to a certain trading area or lower shipping costs.

When a contract-packager's prices are lower it is because his overhead, both direct and indirect, and his labor costs benefit from streamlined facilities and specialization of methods and labor force. Of course, a contract packager must add his profit and this will often bring his cost up to one somewhat comparable to that of the prime manufacturer. Some manufacturers try to compare their direct labor costs, alone, with the final price offered by the contract packager. Naturally this does not give an accurate comparison.

Choosing a contractor

As much care should be used in choosing a contract packager as in choosing a law firm, an advertising agency or other vital service. Once a contract packager has been selected, he should be taken into the confidence of the customer and given full information concerning sales, re-design, package problems and other pertinent facts. The contract packager should be treated as if he were one of the company's plant managers.

Many firms are quite hesitant to package any item outside their own plant because of a belief that it is to their benefit to manufacture everything possible in their own plant and thereby have a larger volume over which to spread their overhead. This is often a valid reason for limiting contract packaging, but it must also be kept in mind that it is often good business to subcontract a percentage of business at all times, for this second source can prove a most important asset in the event of a strike, fire, flood or any other of the many possible causes of disrupted production.

The nature and amount of work to be contracted determine to a large extent the type of contract service needed and geographical location will have considerable influence on the product-manufacturer's choice. The conclusion is this: that practically any kind of service can be had and that the manufacturer has a wide choice of firms, ranging from small to very large, whose facilities meet many standard as well as nonstandard needs.

PHOTO COURTESY MCGUIRE & CO.



Packaging of petroleum products is frequently handled by contract packagers, whose facilities include rail sidings, storage tanks and special equipment.

Legal aspects of packaging

by HILDA F. FROMM

Numerous and varied legal-compliance problems confront manufacturers, packers and distributors of foods, drugs, beverages, cosmetics and practically every other type of product. The purpose of this article is to discuss briefly and in their broadest sense the basic legal necessities of packaging and labeling. Because of the complexity of the over-all Federal, state and local rules and regulations governing the items mentioned, it is impossible here to attempt to answer the many queries which might be posed by the manufacturer, packer or distributor of the varied commodities entering into commerce.

When presenting a product to the consuming public, the major factor is, of course, economic gain. It is necessary to create good will, establish integrity and trust to promote and maintain this gain. The public naturally assumes that the manufacturer, packer and distributor will keep the consumer's health and welfare uppermost in mind. Needless to say, in so doing, benefits are reaped from the public confidence. On the other hand, citations and prosecutions for negligent packaging, adulteration or misbranding, resulting from product contamination, substandard fill, quality, strength or purity, are—when brought to public attention—capable of causing irreparable damage.

Design and construction

True, a competitive market makes it important to design containers, packages and outer wrappings for eye appeal and "bargain" demand. Nevertheless, deceitful design or construction of containers with false bottoms, side walls, lids or covers, or filled so as to lead the purchaser to believe he is purchasing a larger quantity than the package actually contains, should be avoided. Such practices can involve serious legal consequences and lead to financial penalties.

Further, that portion of the package or wrapper which comes into immediate contact with foods, drugs or cosmetics must not be composed of any toxic substance which presents a hazard to public health. Moreover, a package which causes injury to a user may lead to expensive claims for damages. Thus good business as well as common sense call for alertness and prohibit imprudent practices.

Product name

First and foremost among labeling requirements is the product name. All foods, drugs, cosmetics and devices must be labeled with their common or usual name as set forth in the United States Pharmacopoeia and/or other official compendium, or in government Standards of Identity.

In the absence of a standardized name and if the product is not an imitation of a standardized product, a name may be coined which is a true and accurate description of it. In many instances, a product, through constant trade use by a particular industry, becomes known by a specific designation and this product name becomes generally recognized as its common or usual name.

Here too, deception is not tolerated. Use of a devised product name not accurately descriptive of the product or the inclusion of the name of a geographical location which is misleading as to its origin (thereby suggesting to the consumer that he is purchasing some other product) can cause serious complications.

Generally, it is a wise practice to show all the words comprising a product name in lettering of the same size, style, type and color, in the same background and with equal prominence. Thus no misleading impressions can be given, because the product name is read as one unit.

Necessary declarations

Under certain conditions it is compulsory that specific declarations accompany a product name. These declarations, of course, depend upon the product involved. Some of them are:

1. A listing of optional ingredients as required by Standards of Identity.
2. Statements of the presence of artificial coloring, artificial flavoring or chemical preservatives.
3. Use of the word "Imitation" if it applies and is allowed.
4. A complete listing of the ingredients that constitute a nonstandardized product. These ingredients must

FEDERAL AGENCIES REGULATING PACKAGING AND LABELING

Agency	*Products regulated*				
	Food or soft drinks	*Drugs & cosmetics*	*Chemical products*	*Alcoholic beverages*	*Other*
Civil Aeronautics Administration					X
Department of Agriculture	X	X	X		
Department of Health, Education & Welfare, Food & Drug Administration	X	X	X		X
Department of the Treasury					
Internal Revenue Service					
Alcohol Tax Unit				X	
Tobacco Tax Unit					X
Bureau of Customs	X	X	X	X	X
Coast Guard					X
Federal Trade Commission	X	X	X	X	X
Interstate Commerce Commission					X
Post Office Department	X	X	X	X	X

be listed in their order of prominence by weight and by their common or usual name. Abbreviations which are ambiguous or obscure should not be used to avoid misunderstanding.

5. The name, quality, kind, proportion of certain drugs, whether a derivative of another drug and whether active or inactive.

6. Where applicable, adequate directions for use and warnings.

It is well to refer to the Federal Food, Drug and Cosmetic Act and other applicable state and local rules and regulations for detailed information on the terminology to be used and to learn what declarations are required for a specific product.

Quantity of content. The quantity of the contents within a container must be declared in terms of weight (avoirdupois pounds and ounces); liquid measure (gallons, quarts, pints and fluid ounces); dry measure (barrel, bushel, peck, dry quart and dry pint); numerical count—whatever the case may be—or a combination of these, according to custom.

These declarations must be expressed in the number of the largest of such units. For example, a package containing 32 oz. must declare the content as 2 lb. rather than 32 oz. It is imperative that the quantity declaration be the minimum or average, since unreasonable variations and acute shortages are not permitted. However, tolerances are allowed, depending upon the product and circumstances, and certain exemptions are allowed with regard to (1) bulk shipments, (2) packages holding ½ fluid or avoirdupois oz. or less and (3) packages containing less than six units which can be easily seen and counted through the outer wrapping.

Assumptions as to tolerances and exemptions allowed should not be presumed. Regulations governing these must be thoroughly investigated to determine whether they apply to the product being packed and labeled.

Mandatory information. The best procedure to follow when designing a package or container is to create one or two main or principal panels where the product name, net-content designation, corporate information, required declarations and statements, etc. will appear in a prominent and conspicuous manner. This information must not be obscured by designs, other words, statements, written, printed or graphic matter or appear in lettering so minute or illegible that it cannot be seen and read.

There are in existence many laws in various states controlling the size and style of the type in which this information is to appear. It is the responsibility of the manufacturer, packer and distributor to make themselves aware of these existing regulations so as to avoid the loss of time and money arising out of noncompliance with these regulations.

Time and again when this advice is given, the old cry goes up, "But it ruins my design." It is not an impossibility to combine this mandatory information with good design. Proof of this exists on every shop shelf in the country.

Sources of information

Before proceeding with the packaging and labeling of any product intended for interstate commerce, Federal Acts and regulations should be reviewed to assure compliance, namely, those governing imports and exports, wool products, distilled spirits, biological products, caustic poisons, filled milk and cheese, nonfat dry milk solids, tea, sea food, horse meat, insecticides, fungicides and rodenticides, butter, oleomargarine, chemical additives to foods dietary foods, viruses, serums and toxins, coal-tar colors, new drugs and the certification of antibiotics and antibiotic-containing drugs.

Other essential laws and regulations to be considered which pertain to the packaging, labeling, packing, shipping, selling, advertising, grading, and standardization of products in general are those promulgated under and administered by the various Federal agencies (See chart, Federal Agencies Regulating Packaging and Labeling, page 38).

It must also be borne in mind that, even if the product does not enter into interstate commerce, there are many state acts and regulations similar and often identical to the Federal rules (See chart, page 42).

Protection of designs

The development of a new package, packaging method, package design or trademark considered to be original, novel and of commercial value brings forth the need for proper protection of these creations. Three types of coverage are available: (1) patent, (2) copyright or (3) trademark registration. Each procedure differs with respect to the type of material to be covered and the time spent in submission of the application.

Before delving into these procedures, a caution should be expressed. The old saying, "Great minds do run in the same channels," may apply, for the possibility exists that someone else may have thought of it first. To avoid the complications of an infringement claim, a search should be made in the U. S. Patent Office to determine the availability of a trademark or the existence of a prior patent.

Copyright. Although a copyright registration is granted without a search, this does not preclude the possibility of copyright infringement if the design to be registered closely resembles a design already in use and is likely to cause confusion in trade.

Assuming that the artistic design of a package or accompanying label is new and original, the following procedure is necessary to obtain copyright protection:

The package or label must bear the copyright notice, which may consist of the word "Copyright" or the abbreviation "Copr." followed by the name of the individual or organization seeking the registration. A permissible alternative is the symbol © followed by the name or initials of the individual or organization. If initials are used, the complete name of such individual or organization must also be printed somewhere on the package. The year of publication may be included in the copyright notice but this is not mandatory.

The package bearing the copyright notice must then be entered into commerce or "published," to use the phraseology of the Copyright Act.

Application forms may be obtained without charge upon written request to the Registrar of Copyrights, Library of Congress, and after proper execution may be submitted together with the necessary fee and two complete and legible specimens of the package or label. If the package copies are constructed of bulky material, an additional photostatic copy is a requisite.

After a period of 27 years, which is one year less than the life of the copyright, a renewal application must be filed by the owner of the copyright if it is desired to continue protection of the original design or label.

Trademarks. Under the Trademark Act of 1946, a citizen or foreign national has the right to make applica-

tion to register in the Patent Office a trade or commercial name, trademark, service mark, certification mark or collective mark. The do's and don'ts surrounding the registration of such names and marks are extensive. General information, laws and rules pertaining to trademarks may be obtained in pamphlet form from the Patent Office without charge.

A trademark is defined in the Act as any word, name, symbol or device or any combination of these adopted and used by a manufacturer or merchant to identify his goods and distinguish them from those manufactured or sold by others.

When creating a trademark for which a registration is desired, it must be remembered that the nature of the mark may render it unregistrable. Some of the grounds on which a mark is refused registration are:

1. It resembles a trademark already registered or used by someone in the United States who can claim exclusive rights in such mark through long years of use.

2. It comprises the flag or coat of arms or other insignia of the United States, its territories, any state, municipality, foreign nation or particular organizations, such as the Red Cross and the Boy Scouts of America.

3. It consists of a name, portrait or signature of a living individual and written consent has not been given for its use by the individual.

4. It is a surname, description or misdescription of the goods to which it is applied.

5. It is a geographical description or misdescription of the goods which is deceptive.

It is possible, however, to register certain trademarks falling within one of these groups if the mark has been used in commerce for a period of five years without opposition and the applicant can prove that he has established exclusive rights in the mark through continuous use.

After the newly created trademark has been used in interstate commerce, application for trademark registration may be submitted. This application must be in written form, as prescribed by the Commissioner of Patents and signed and sworn to by the applicant. It is then submitted to the Patent Office, together with the filing fee, a drawing of the mark and five specimens on which the mark appears. In the event the application is based on a prior foreign registration, a certified copy of the foreign registration must also be submitted.

When a trademark registration is granted, registration notice, "Registered in U. S. Patent Office," "Reg. U.S. Pat. Off." or the registration symbol ® should be shown in close proximity to the registered trademark. It is important that one of these notices accompany the mark wherever it is displayed, since neglecting to do so can seriously hinder recovery of damages in a suit for infringement.

Another act of possibly serious consequence is the discontinuance of use of a registered trademark for a period of two years. Such non-use creates a presumption of abandonment and may lead to cancellation of the trademark.

Caution should also be exercised with regard to the use of a registered trademark in descriptive matter and advertising. Through improper use, a mark can dissolve into a generic word or common descriptive name which then makes it public property or puts it into the public domain. Every precaution should be taken to prevent this catastrophe by making it known whenever the mark is displayed that the mark is registered in the U. S. Patent Office.

Subject to filing an affidavit of use after five years, a trademark registration remains in force for 20 years. If continued protection is desired, a renewal application must be filed six months before the expiration date.

Patents. After an invention for a new package construction or packaging process has been perfected, it is advisable to file a patent application at the earliest possible date. In the event this protection is desired after the new package or packaging method has been in commercial use, it is imperative that the patent application be filed prior to the lapse of one year of such use for a valid claim.

The patent application must be in written form, signed and sworn to by the inventor, and must include a complete description of the packaging construction or packaging process and claims defining the invention. When in proper form, the application—accompanied by a drawing of the invention (if it can be illustrated), an oath, power of attorney, petition form and the filing fee—should be forwarded to the U. S. Patent Office for examination. The detailed procedure embracing the form for filing a patent application requires expert knowledge. A patent attorney should be consulted.

Although notices of patent protection are not mandatory, it is good practice to make known to the public the fact that a patent has been applied for or issued so that, in the event of an infringement suit, damages may be recovered. Either of the following notices are acceptable and should be shown somewhere on the package in one of the wordings given: "Patent Applied for" or "U. S. Patent Applied for"; "Patent No. —," "U. S. Patent No. —," or "Manufactured under U. S. Patent No. —."

The life of an issued patent, except a design patent, is 17 years and differs from trademark or copyright registration in that it cannot be renewed. Upon its expiration, the invention becomes public property.

Pamphlets containing general information concerning patents may be obtained upon request from the Commissioner of Patents free of charge. Obtaining protection in foreign countries for valuable package designs, packaging methods and trademarks is important. Since foreign protection laws differ widely, it is best to seek the advice of an attorney specializing in this type of practice for guidance as to proper procedure.

Conclusion

The network of laws, rules and regulations controlling the packaging and labeling of products is complex and intricate. The foregoing information makes no pretense at being complete. It is recommended, therefore, that legal advice be sought from competent attorneys in the various fields to prevent the costly complications surrounding violations.

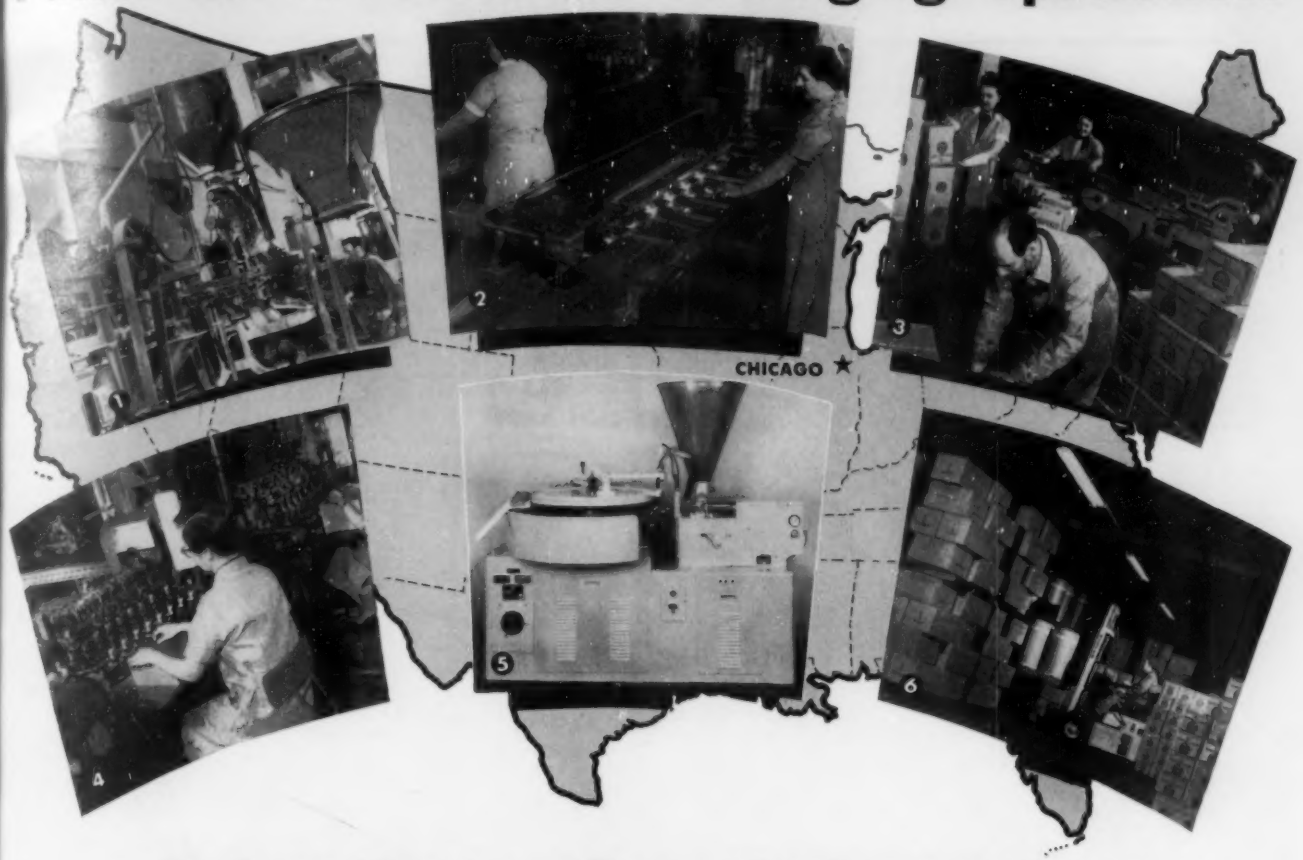
Once the legal requirements for a package have been established, it then becomes the responsibility of the various departments concerned—package production, sales, advertising, etc.—to acquaint themselves with the requirements, translate them into procedure and guard against practices involving liability or legal penalties.

Certainly the well-equipped, well-maintained packaging line supplied with uniform, quality materials and operated to meet high standards or guided by a program of statistical quality control is a line properly conceived to turn out safe packages that are accurately and uniformly filled and produced economically.

Moreover, the package that is skill-

(Turn to pages 42 and 44)

Paket Inc... Contract Packaging Specialists



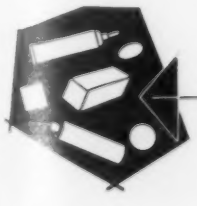
Paket Know-How & Equipment

...Servicing Your Products... Cuts Packaging Costs!

1. Pneumatic scale line with automatic Seal-Spout inserting machine.
2. Ceco automatic cartoning machine, specially built for either tuck or glue boxes, imprint identification at both ends of carton, impression stamp batch control numbers.
3. Haysen automatic wrapping machine equipped with electric eye . . . also Miller wrapping machines.
4. Famous Arenco high-speed tube fillers . . . equipped for cap tightening, vacuum cleaning and westiting.
5. Saga high-speed filling and sealing machine for "Bracon" polyethylene tubes. Also Volumetric filling machines and Elgin "Twin" filling equipment for cans, bottles and jars.
6. Over 22,000 sq. feet of spotless working area. Spacious receiving and warehousing area—modern handling equipment.

We specialize in filling powders, liquids and pastes in all styles and sizes of tubes, boxes, jars, bottles, cans, etc. Our modern, new plant is geared for high-speed production plus plant-wide quality control. All work guaranteed for quality and accuracy — we gladly extend warehousing and drop-shipping services.

TRIAL SAMPLE OF YOUR PRODUCT FILLED WITHOUT COST OR OBLIGATION



PAKET, INC.

9022 S. Baltimore Ave., Chicago 17, Illinois

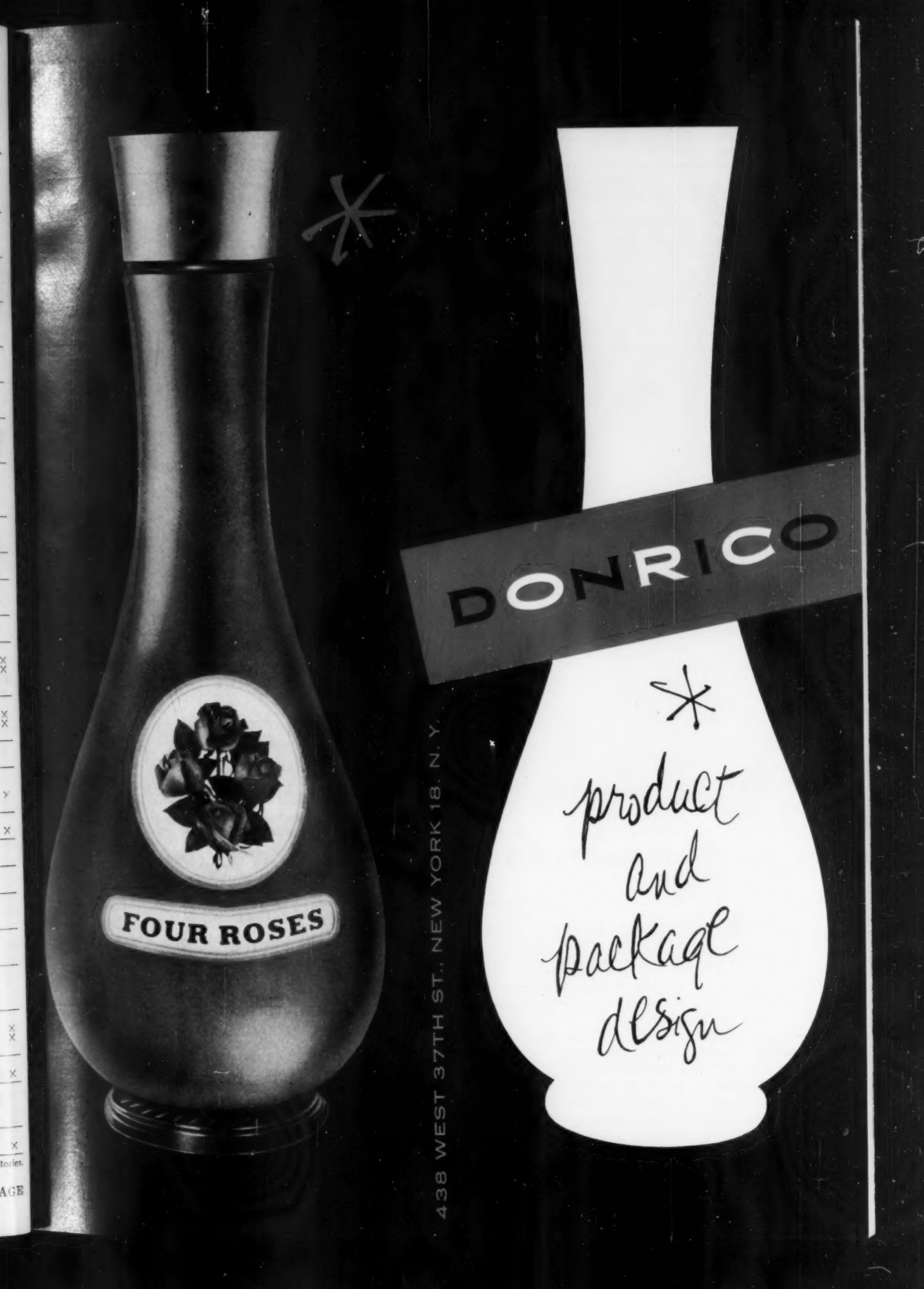
filling and cartoning specialists — packaging and creative designs

WHEN IN CHICAGO . . . VISIT OUR PLANT. CALL BAyport 1-5737 FOR APPT.

State agencies regulating packaging*

State and agencies	Food or soft drinks	Drugs & cosmetics	Chemicals	Alcoholic beverages	Other
Alabama					
Dept., Agric. & Industries	×	×	×		
Arizona					
Dairy Comm.	×				
Dept. of Health	×				×
Liquor License & Control				×	
Bd. of Pharmacy		×	×		
Insp., Weights & Measures, Mesa	×	×	×	×	×
Arkansas					
Alcoholic Beverage Control				×	
Bd. of Health	×	×			
California					
Dept. of Agric.	×		×		×
Dept. of Public Health, San Francisco	×	×		×	×
Colorado					
Dept. of Agric.	×				
Dept. of Health	×	×	×		
Connecticut					
Food & Drug Comm.	×	×		×	
Delaware					
Bd. of Agric.		×	×		
Bd. of Health	×	×			
Liquor Comm.				×	
Florida					
Dept. of Agric.	×	×	×		×
Beverage Dept.				×	
Georgia					
Dept. of Agric.	×		×		
Bd. of Pharmacy		×			
Dept. of Revenue				×	
Hawaii (*Territory of*)					
Bd. of Agric. & Forestry			×		×
Dept. of Health	×	×	×	×	
Idaho					
Dept. of Public Health	×	×			
Public Utilities Comm.			×		
State Liquor Dispensary				×	
Illinois					
Dept. of Agric.	×				
Liquor Control Comm., Chicago				×	
Dept., Public Health, Chicago	×				
Dept., Registration & Education		×			
Indiana					
Bd. of Health	×	×	×	×	×
Iowa					
Dept. of Agric.	×		×		
Liquor Control Comm.				×	
Pharmacy Examiners		×	×		
Kansas					
Bd. of Agric.			×		
Alcoholic Beverage Control				×	
Bd. of Health	×	×	×		
Kentucky					
Dept. of Health, Louisville	×	×	×	×	
Louisiana					
Dept. of Health, New Orleans	×	×	×	×	
Maine					
Dept. of Agric.	×	×	×		
Maryland					
Dept. of Health, Baltimore	×	×			×
Alcoholic Beverage Div.				×	
Massachusetts					
Alcoholic Beverages Control Comm.				×	
Dept. of Labor & Industries	×				
Public Health Dept.	×	×	×		
Michigan					
Dept. of Agric.	×		×		×
Bd. of Pharmacy		×			
Liquor Control Comm.				×	
Minnesota					
Dept. of Agric., Dairy & Food	×		×		×
Liquor Control Comm.				×	
Mississippi					
Dept. of Agric. & Commerce					×
Bd. of Health	×				
State Chemist, State College		×	×		
Missouri					
Dept. of Agric.			×		
Div. of Health	×	×			
Liquor Control				×	
Montana					
Dept., Agric., Labor & Industry					×
Bd. of Health	×	×	×		
Liquor Control Board				×	
Nebraska					
Dept. of Agric. & Inspection	×				
Health Dept.		×	×		
Liquor Comm.				×	
Nevada					
Dept. of Agric., Reno			×		
Dept. of Food & Drugs, Weights & Measures, Reno	×	×			×
New Hampshire					
Dept. of Agric.	×				
Dept. of Health	×	×	×	×	
New Jersey					
Dept. of Health	×	×	×		
Dept. of Law & Public Safety	×	×		×	
New Mexico					
Dept. of Public Health	×	×			
Div. of Liquor				×	
Law Dept.			×		
New York					
Dept., Agric. & Markets	×				
Dept. of Health			×		
Liquor Authority				×	
Bd. of Pharmacy		×			
North Carolina					
Dept. of Agric.	×	×	×		
Bd. of Alcohol Control				×	
North Dakota					
State Labs. Dept.	×	×	×	×	
Ohio					
Dept. of Agric.	×	×	×		
Dept. of Liquor Control				×	
Oklahoma					
Dept. of Health	×	×		×	
Oregon					
Dept. of Agric.	×		×		×
Bd. of Health, Portland					×
Bd. of Pharmacy, Portland		×	×		
Liquor Comm.				×	
Pennsylvania					
Dept. of Agric.	×		×		×
Dept. of Internal Affairs	×	×	×		×
Liquor Control Bd.				×	
Rhode Island					
Dept. of Health	×	×			
South Carolina					
Dept. of Agric.	×	×			
Secretary of State					×
Tax Comm.	×			×	
South Dakota					
Dept. of Agric.	×	×	×	×	×
Tennessee					
Dept. of Agric.	×	×	×	×	
Texas					
Dept. of Health	×	×			
Utah					
Dept. of Agric.	×	×	×		
Liquor Control Comm.				×	
Vermont					
Dept. of Health, Burlington	×	×	×		
Liquor Control Bd.				×	
Virginia					
Dept. of Agric.	×		×		
Alcoholic Beverage Control Bd.				×	
Bd. of Pharmacy		×			
Washington					
Dept. of Agric.		×	×		×
Bd. of Pharmacy		×	×		×
Liquor Control Bd.				×	
West Virginia					
Dept. of Labor	×	×	×	×	×
Wisconsin					
Dept. of Agric.	×	×	×	×	
Bd. of Health			×		
Dept. of Taxation	×			×	
Wyoming					
Dept. of Agric.	×	×			×

*Agencies are located in state capitals, unless otherwise noted. Information in this table is based on replies to questionnaires sent all states and two territories.


FOUR ROSES
DONRICO
product and package design
438 WEST 37TH ST., NEW YORK 18, N. Y.

Chemical Ingredients Acceptance Table for Plastics Used in Food Packaging*

Components	*Applicability*[1]
Resins	
Condensate of dimethyl terephthalate and ethylene glycol	Satisfactory
Copolymers of maleic glyceride, maleic anhydride, or diethyl maleate with vinyl, or phenol formaldehyde resins	Undetermined
Hydrogenated rosin	Not accepted
Melamine-formaldehyde polymer	Satisfactory
Polymer of 2-chlorobutadiene	Satisfactory
Polymerized rosin	Not accepted
Polymers of epichlorohydrin and bisphenol	Undetermined
Resins from high- and low-viscosity polyvinyl alcohol	Satisfactory
Rubber hydrochloride	Satisfactory
Silicone oil	Satisfactory
Urea-formaldehyde polymer	Satisfactory
Plasticizers	
Acetyl tributyl citrate	Satisfactory
Butyl acetyl ricinoleate	Undetermined
Butyl benzyl phthalate	Undetermined
Butyl stearate	Satisfactory
Dibutyl sebacate	Satisfactory
Dicetyl phosphate	Undetermined
Di-iso-octyl phthalate[2]	Satisfactory
Iso octyl isodecyl phthalate	Undetermined
Polyester epoxide	Undetermined
Polyisobutylene	Undetermined
Triacetin	Undetermined
Tricresyl phosphate	Not accepted
Triethyl citrate	Undetermined
Tri-iso octyl phosphate	Undetermined
Trimethyl hexyl adipate	Undetermined
Tripropionin	Undetermined
Stabilizers	
Aluminum ethyl caproate	Undetermined
Compounds of selenium, cadmium, lead, barium, boron, antimony and mercury	Not accepted
Potassium, sodium and ammonium citrate	Satisfactory
Strontium laurate	Undetermined
Tin dibutyl dilaurate	Undetermined
Tin dibutyl laurate maleate	Undetermined
Tin stearate	Satisfactory
Release agents	
Oleic acid amide	Satisfactory
Polyoxyethylene glycol 400	Satisfactory
Release agents (cont'd)	
Silicone oil of 350-centistokes viscosity	Satisfactory
Stearic acid amide	Satisfactory
—	
Anti-oxidants	
Butylated hydroxy toluene (BHT)	Satisfactory
Hydroquinone monobenzyl ether	Undetermined
Mono and diheptyl amine derivatives of diphenylamine	Undetermined
Para-phenyl phenol	Undetermined
Phenyl alphanaphthylamine	Undetermined
Phenyl betanaphthylamine	Undetermined
Accelerators	
Tetraethyl thiuramdisulfide	Not accepted
Tetramethyl thiuramdisulfide	Not accepted
Colorants	
Coal-tar colors, FD & C certified colors only	Satisfactory
Mineral pigments: titanium dioxide, oxides of iron, carbon black	Satisfactory
Emulsifiers	
Decyl benzene sodium sulfonate	Not accepted
N-octa decyl disodium sulfosuccinamate	Not accepted
Antimycotics	
Captan	Undetermined
Ferbam	Undetermined
Methyl and propyl parahydroxy benzoates	Satisfactory
Sodium and calcium propionate	Satisfactory
Sodium benzoate	Satisfactory
Sorbic acid	Satisfactory
Protectants against insects	
DDT	Undetermined
Methoxychlor	Undetermined
Pyrethrins in combination with piperonyl butoxide	Undetermined
Protectants against rodents	
Cyclohexylamine complex of zinc dimethyl dithiocarbamate	Not accepted
Polethylene polysulfide	Not accepted
Quaternary ammonium compounds	Not accepted
Sodium fluosilicate	Not accepted

* Based on a table prepared by A. J. Lehman, Div. of Pharmacology, Food and Drug Administration, Dept. of Health, Education & Welfare, Washington, D. C. See "F & DA Acceptance Criteria," MODERN PACKAGING, Jan., 1955, p. 117 and the *Quarterly Bulletin* of the Assn. of Food and Drug Officials of the United States, Vol. XVIII, No. 4, Oct., 1954, and Vol. XV, No. 3, July, 1951.

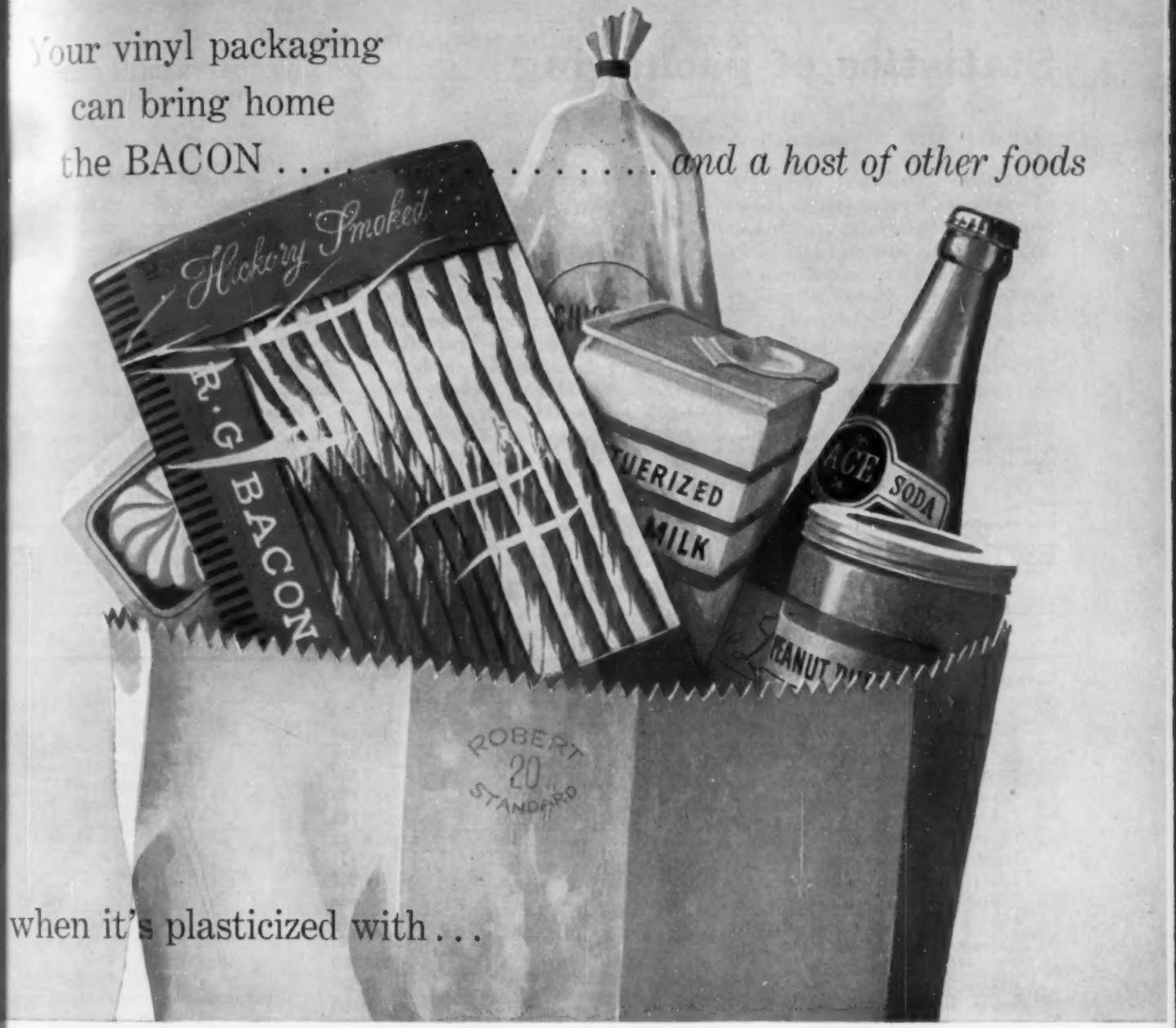
[1] *Satisfactory*—Safety as component of a food package has been demonstrated. *Undetermined*—Unevaluated or evidence of safety insufficient. *Not accepted*—Considered a contaminant or too toxic for use. The status of the components listed in this table is that existing as this material goes to press. As additional studies are made and evaluated, the acceptability status of some components undoubtedly will change.

[2] Because phthalates are readily oil soluble, limitations have been placed on this plasticizer as a component of a wrap for foods with a high fat content, such as bacon, butter and lard.

fully developed to protect the product it contains and designed to identify the product clearly and quickly and to stimulate repeat purchases will find few if any conflicts between effective sales requirements and safe legal requirements. In proof of this there is the evidence of numerous restrictive statutes that are not only supported by leading firms, entire industries or trade groups, but which may have been initiated and sponsored for enactment by them.

The legal protection devised for packaging developments, trademarks or designs deserves careful attention on the part of those concerned with packaging operations. This means respect for the rights of other firms, too, for not only is the question of infringement involved, but there is also always present a challenge to find original methods or designs that will be different and better.

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when it's plasticized with . . .

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Statistics of packaging

by CHARLES A. LEWIS*

Statistics of packaging reflect the accelerated upward growth of demand for containers and packaging materials. These changes in the packaging field can be correlated with repetitive consistency to technological as well as socio-economic advances.

Technological advances in the fields of medicine, chemistry, physics, engineering, transportation, food, etc., established a perpetual challenge to packaging industries. This challenge has been met by container industries in the form of new or modified or redesigned containers or packaging materials. Aside from expanding total demand for packaging, the impact of new technological developments on packaging industries has resulted in the creation of new packaging materials or industries, such as aluminum foil and transparent flexible films, and major shifts in end-use demand.

Socio-economic changes have also had a tremendous effect on packaging. A good capsule example of this is the rise and success of self-service and self-selection merchandising. The economics embodied in this type of retailing, that is, minimum labor costs, increased product turnover, reduced inventories, etc. stimulated container manufacturers to create new packages or redesign existing packages. Other major economic considerations which have similarly affected package de-

* Director, Containers and Packaging Div., Business and Defense Services Administration, Dept. of Commerce, Washington, D. C.

ESTIMATED PRODUCTION OR SHIPMENTS OF SELECTED CONTAINERS 1940, 1950, 1953, 1954

Type of container	1940	1950	1953	1954
Consumer				
Metal cans (1,000 tons of steel)	2,192	3,893	4,082	4,143
Metal crowns (1,000 gross)	143,929	344,196	315,956	313,741
Metal closures, commercial (million units)	5,677	11,638	12,215	12,856
Plastic closures[1] (million units)	n.a.	2,554	2,682	2,579
Glass containers (1,000 gross)	52,116	106,380	128,892	126,898
Collapsible tubes (1,000 gross)	3,755	6,792	6,682	6,666
Paper milk bottles (stock in tons)	n.a.	219,920	356,100	
Hood and lid covers (stock in tons)	n.a.	26,871	12,455	
Milk-bottle plugs (stock in tons)	n.a.	18,197	15,788	
Liquid-tight containers (stock in tons)	n.a.	47,308	44,032	843,000
Cups, round nested containers (stock in tons)	n.a.	106,219	182,469	
Ice cream, frozen food, butter cartons (stock in tons)	n.a.	189,389	259,158	
Folding paper boxes (1,000 tons of board)	1,398	2,356	2,429	2,393
Set-up paper boxes (1,000 tons of board)	613	709	763	710
Fibre cans, tubes and drums (1,000 tons of stock)	n.a.	315	331	286
Bag paper, including grocery & variety (1,000 tons)	606	760	847	921
Aluminum foil, including foil in lamination (1,000 lb.)	n.a.	106,700	131,500	180,000
Plastic bottles (thousands of lb.)	n.a.	n.a.	6,200	8,000
Transparent films for packaging (millions of lb.)	n.a.	300	388	465
Shipping				
Steel drums & pails (1,000 tons of steel)	572	925	1,010	781
Nailed wooden boxes (million bd. ft.)	4,295	5,000	4,800	3,880
Wirebound boxes (1,000 units)	28,175	158,087	186,367	189,875
Slack cooperage (1,000 units)	35,000	23,370	20,700	19,500
Tight cooperage (1,000 units)	9,675	4,472	2,200	2,235
Metal strapping (1,000 tons of steel)	100	350	335	315
Corrugated & solid-fibre containers (1,000 tons of stock)	3,114	5,830	6,739	6,432
Fibre drums (1,000 units)	3,500	26,000	27,300	26,000
Shipping-sack paper (1,000 tons)	195	748	783	797
Textile bags (million yards)	1,538	1,158	1,065	1,025
Gas cylinders (1,000 tons of steel)	n.a.	97	102	90
Veneer packages (million sq. ft. of veneer)	1,529	1,100	1,200	1,300

SOURCE: Department of Commerce, Bureau of the Census, and trade association and industry representatives. [1] Excludes caps for collapsible tubes. N.a. = not available.

END-USE DISTRIBUTION OF SELECTED CONTAINERS

Consumer-type containers	% of shipments 1953	1954
Metal Cans		
Fruits, vegetables, juices	34.0	32.4
Beer	15.1	15.6
Dairy products	6.5	6.5
Oil (open top, 1 and 5 qt.)	6.3	6.6
Fish and sea food	2.5	2.6
Pet foods	3.0	3.2
Lard and shortening	2.3	2.9
Meat, including poultry	3.1	3.4
Coffee	5.0	4.3
Soft drink	n.a.	1.1
Other	22.2	21.4
	100.0	100.0
Glass Containers		
Food	34.7	36.8
Medicinal and health supplies	14.7	15.5
Beer, nonreturnable	6.8	6.2
Beer, returnable	2.3	1.7
Beverage, nonreturnable	0.7	0.8
Beverage, returnable	7.0	5.1
Household and industrial	8.6	8.9
Toiletries and cosmetics	8.0	8.7
Dairy products	2.6	2.2
Wines	3.3	3.4
Liquor	7.2	7.0
Packers tumblers	1.6	1.6
Direct export	2.5	2.1
	100.0	100.0
Collapsible Tubes		
Medicinals and pharmaceuticals	20.0	18.5
Cosmetics	8.5	8.7
Shaving cream	7.5	6.2
Dentifrices	47.6	49.6
Food products	0.1	0.1
Household and industrial	16.3	16.9
	100.0	100.0
Folding Paper Boxes		
Food, candy and baked goods	34.1	36.4
Soaps and cosmetics	18.5	18.0
Tobacco and related products	7.2	7.0
Paper goods or products	6.1	7.5
Hardware, appliances and automotive products	5.8	5.2
Medicinal products	3.8	3.6
Beverages	6.2	5.9
Retail boxes	5.9	5.1
Indirect military uses	0.4	0.4
Sporting goods and toys	1.5	1.5
Other	10.5	9.4
	100.0	100.0

Shipping containers	% of shipments 1953	1954
Corrugated and Solid Fibre		
Food and kindred products	33.1*	30.7*
Beverages	4.1	4.8
Tobacco	1.1	1.0
Textiles and apparel	7.2	6.8
Lumber and wood products except furniture	2.1	1.7
Furniture and fixtures	4.5	4.7
Paper and allied products	7.2	8.3
Chemical, petroleum and coal products	8.6	7.9
Rubber and leather	1.5	1.6
Stone, clay and glass	6.7	7.1
Fabricated metal products	4.5	4.7
Machinery, equipment, etc.	9.0	9.6
Transportation equipment	3.0	2.9
Other	7.4	8.2
	100.0	100.0
Multiwall Paper Sacks		
Agricultural and food	30.2	34.7
Building materials	23.9	21.6
Chemicals and drugs	35.6	34.2
Minerals	7.9	6.8
Miscellaneous	2.4	2.7
	100.0	100.0
Textile Bags		
Commerical feed	22.4	22.1
Potatoes	18.1	18.1
Meal	10.3	8.2
Mill feed	10.1	10.5
Fertilizer	4.7	4.2
Seeds	4.2	5.1
Rice	4.1	4.3
Sand, minerals	3.9	1.3
Beans, peas	2.7	2.5
Flour	1.8	1.4
Grains, nuts	1.4	2.4
Pulp	1.4	1.7
Other	14.9	18.2
	100.0	100.0
Steel Containers		
Pails (20 gauge and lighter)		
Food	4.8	3.7
Petroleum	23.7	24.8
Chemical	17.3	17.1
Paint	27.8	28.6
Military†	0.9	1.0
Other	25.5	24.8
	100.0	100.0

Drums	*(18 gauge and heavier)* 1953	1954	*(19 gauge and lighter)* 1953	1954
Food	7.4	7.0	1.1	1.9
Petroleum	43.4	44.7	48.8	47.9
Chemical	32.3	35.4	28.0	33.8
Paint	6.5	5.8	3.2	2.2
Military†	5.7	2.2	0.1	0.2
Other	4.7	4.9	18.8	14.0
	100.0	100.0	100.0	100.0

* End-use distribution figures of corrugated- and solid-fibre containers are for years 1952 and 1953 inasmuch as data are not available for 1954.
† Direct shipments.

velopment and design include automation, competition, and manufacturing costs such as freight, wages, materials, etc. Socially, self-service and self-selection merchandising are a reflection of the tempo and mode of present-day living, as the primary emphasis is on convenience and fast service to the customer. Container manufacturers are striving to provide packages that are compatible with this emphasis. Some other social factors which have influenced packaging include: size of families, employed mothers, apartment living and more leisure for recreation.

It is undeniable that the technical, social and economic changes of the past have had a tremendous impact on the growth of packaging. We are now at the dawn of a nuclear age, a period which probably holds a far greater challenge to the packaging field than the past. The degree to which container and packaging-material manufacturers meet this challenge can only be accurately measured in the future by a retrospective analysis and continuing consideration of the statistics of packaging.

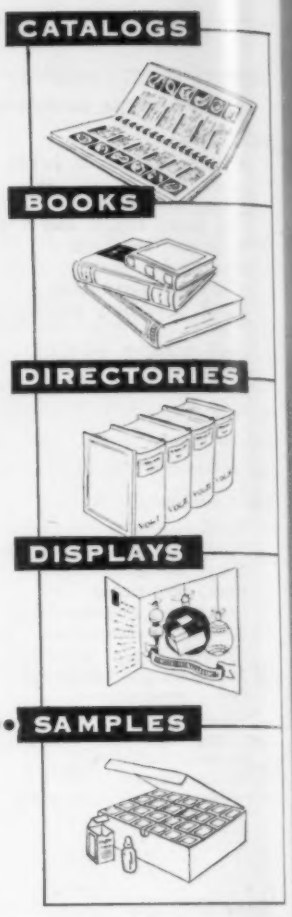
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How to use the Directory

Listed under the headings in the *Subject Index* you will find practically every container, machine, supply and service which is of interest to packagers. First, consult the *Subject Index;* then, refer to the classified lists of suppliers on the page listed. The address of any supplier can be found in the *Alphabetical List of Manufacturers* at the end of the Directory.

If you need further help

Extensive as the Buyers' Directory is, it may lack certain information which you want. In that case, the Readers' Service Department can be of assistance. Your request for data on products not covered in the Directory, or for additional facts on the items listed, will receive prompt, courteous handling.

Reader's Service Department

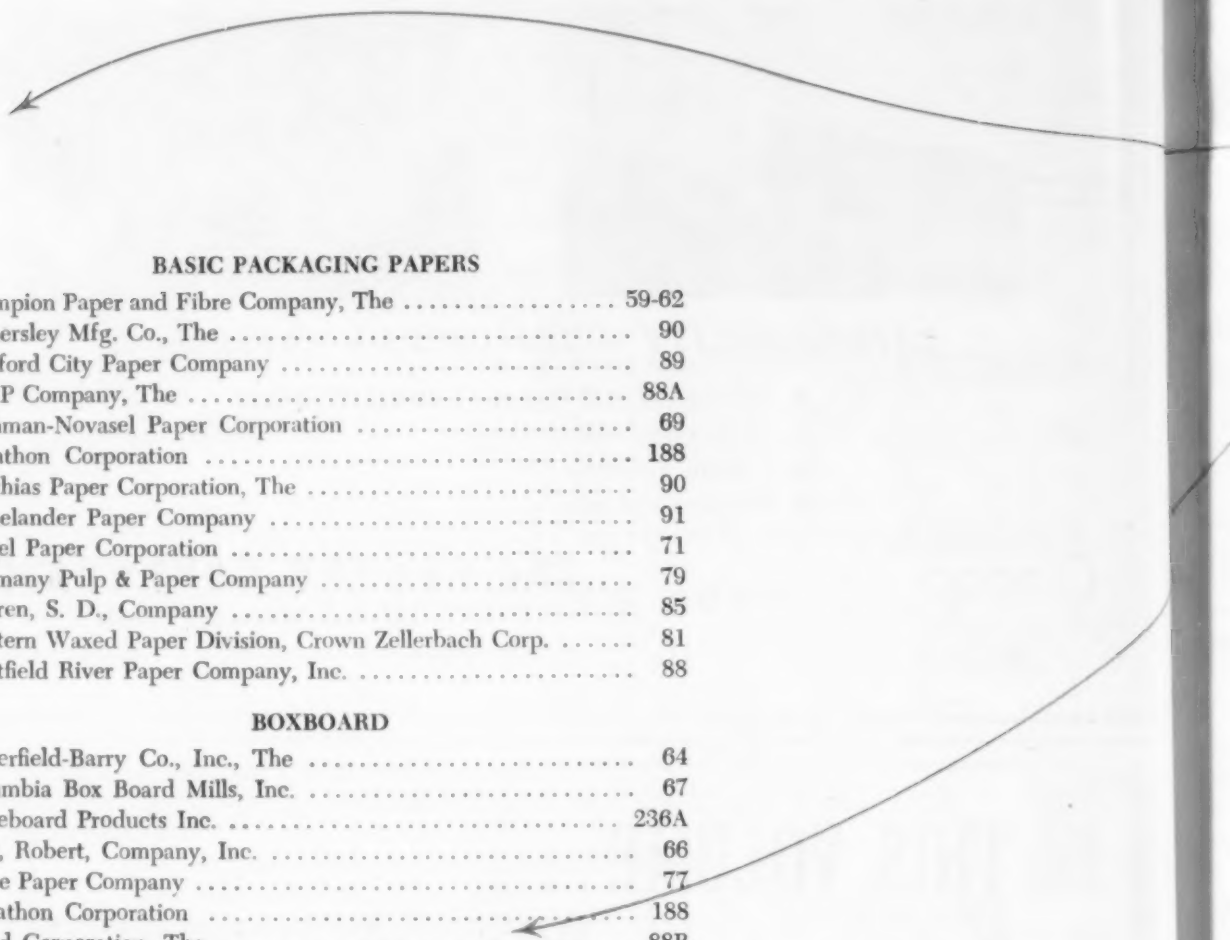
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for SECTION 3—Papers for packaging

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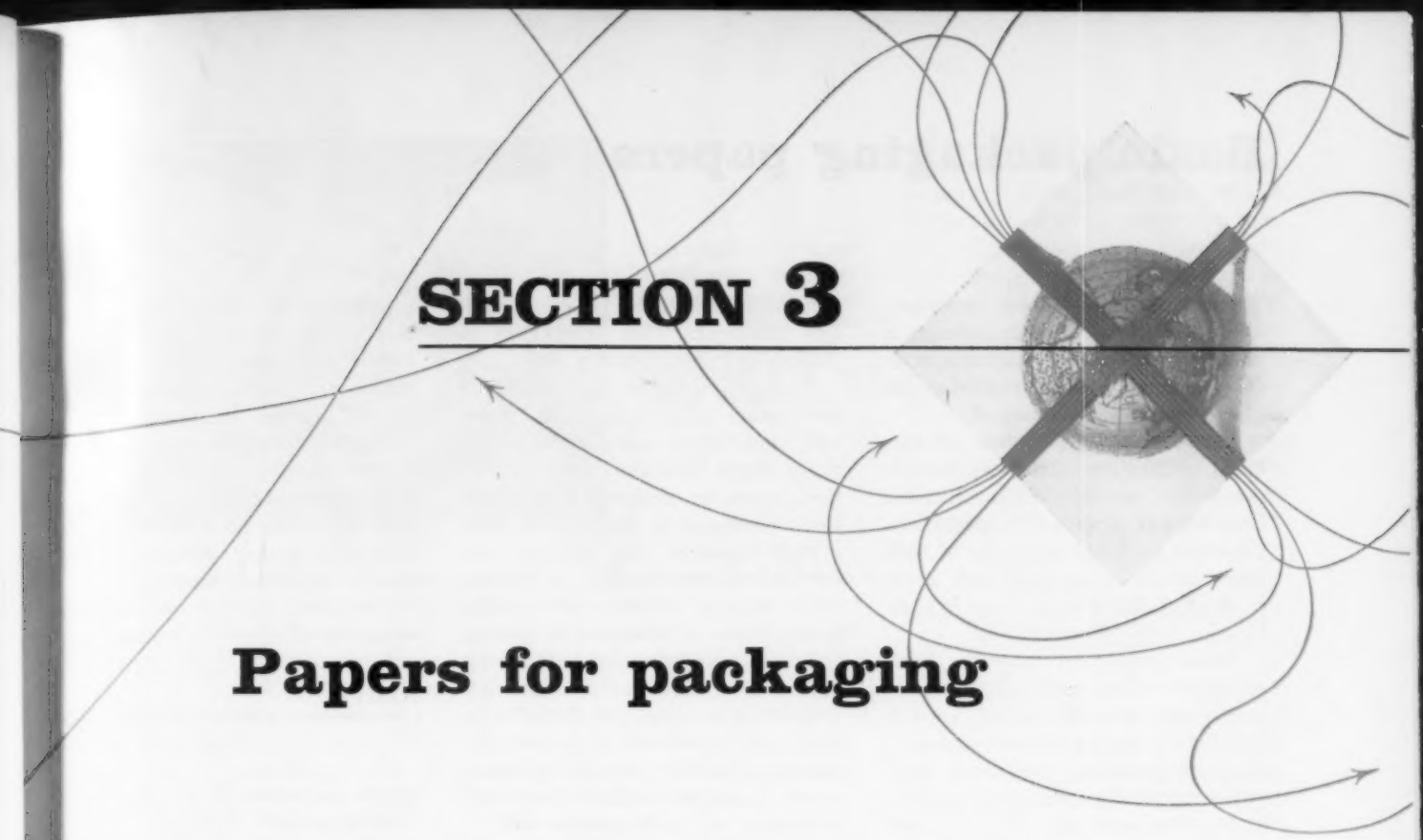
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Basic packaging papers

Paper, because of its versatility, economy and basic importance in packaging, constantly challenges careful, expert consideration on the part of every successful packager.[1]

The articles that follow discuss kraft, glassine, vegetable parchment, greaseproof, waxed and tissue papers. Each type of paper has its specific applications from the standpoint of both function and design, and each is capable of modification or of use in combination with other materials.

Product-protection features. Various papers offer specific advantages in packaging: strength against impact, puncture or tear in shipping and handling—for example, laminated kraft and corrugated papers; impermeability to water, as in polyethylene-coated kraft or in the newer treated glassines; or strength against embrittlement, as in the waxed overwraps for frozen foods. Papers are designed for proofness to water, water vapor, gas, grease or oil; for resistance to flame, tarnish, molds on the paper itself or penetration of the package by insects; for the prevention of corrosion or the formation of molds on the product packaged. Paper can also be designed to be non-toxic, odorless and tasteless, so that it will not alter a food product or give rise to off flavors and odors. One or more of these protective qualities can be built into the paper by various treatments. (See "Properties of Packaging Papers," chart p. 86.)

Package-fabrication features. There are certain advantages to the package itself which may be sought by the package fabricator. Some protective papers are designed with block-free characteristics, that is, they have a high degree of "slip" and as a result do not stick together in processing or storage. Others make possible certain types of wrapping or sealing —the crease-resistant or heat-sealing papers. Good plasticizer retention and nonwicking qualities are desirable in laminated papers. It is of primary importance that the plies of laminates remain joined throughout the period of storage and use to prevent wicking and loss of strength or of some protective characteristic. Stocks must be chosen which will retain complete contact throughout the total area, showing no tendency to separate or curl at edges and seams. Good aging characteristics can be built into papers also, depending on their purpose and on the conditions of use.

All this and printability, too, make paper packages popular with manufacturers. The trend toward repetitive brand identification—from the product itself, where possible, to the outermost layers of the shipping container—has made the excellent printability of papers a real asset.

Proofness. Proofness in paper—as in anything else—is relative. For example, no moistureproof paper is absoluately impervious to water vapor. The question is not whether its proofness is absolute, but whether it is effective. Will it protect the product in packages from water vapor throughout its lifetime, beginning with the packaging operation, through transit, storage, display and use? If it will, and at competitive costs, the paper may be considered moistureproof for a range of products subject to a comparable exposure to moisture.

The same principle applies in the evaluation of all protective papers.

[1] For additional information regarding the tasks paper can perform in packaging as well as the processes by which it is modified to do them, see also in this volume the articles discussing protective coatings for packaging (p. 72), laminations (p. 138), principles of heat-sealing equipment (p. 462) and fancy papers (p. 78).



Excellent packaging properties of paper are well demonstrated by these wraps for bandages, which require strength, purity, tight seals and machinability.

Kraft

by S. W. Franklin*

First manufactured in the United States in 1909, kraft paper has continually expanded in use until today it accounts for more than half the paper production in the country. Its low cost, abundance and utility have made it America's number-one packaging material.

Kraft is a strong, versatile paper made entirely from wood pulp produced by the sulphate process. The natural color of kraft paper is brown, but by the use of semibleached or fully bleached sulphate pulp in combination with dyes, it is possible to obtain a complete range of colors from black to white. Standard colors include red, green, orange, blue and gray. In addition to having an acceptable surface for printing, kraft can be calendered, water marked or striped. There is considerable variation in the kraft sheets made by different mills, especially as between Northern and Southern mills. Kraft paper produced from Southern sulphate pulp seems to have greater strength and flexibility.

Constant laboratory experimentation and quality control have improved kraft paper in recent years, increasing its high strength, resistance to beating and freeness from pitch. Kraft papers have exceptional folding endurance and tearing strength, while their breaking length and bursting strength are superior to those of papers made from sulphite pulps.

Kraft paper comes in two basic fin-

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COURTESY THILMANY PULP AND PAPER CO.



This tough, reinforced kraft paper takes on new job of protecting lumber during storage and shipment—eliminating need for storage in sheds.

ishes—machine finish and machine glaze. More than 90% of the kraft paper sold today is machine finished. Machine-finished kraft is commonly made in basis weights ranging from 26 to 80 lb. per ream of sheets 24 by 36 in., but it can be made for special uses in weights from 18 to 200 lbs.

Machine-glazed kraft has a glazed surface on one side and is generally used by florists, druggists and launderers, who need a wrapping paper with a sleeker appearance and in a lighter basis weight than they can get in a machine finish. Machine-glazed kraft comes in weights from 18 to 45 lb., but generally is sold in 25- and 30-lb. basis weights.

Basis weight is important to the consumer and the producer in defining price, since most paper is bought and sold according to its basis weight. Basis weight can be determined easily and accurately by the use of basis-weight scales, available in full laboratory sizes or in smaller portable sizes.

Although paper is ordered and sold by the pound, roll or ream, it is used most frequently by the square foot or yard. Consequently, if the paper furnished is heavier than specified, the buyer will receive fewer sheets per pound and resultingly less area than he may be counting on. Or if the paper is lighter than required by specifications, the buyer will receive more sheets per pound than he has actually ordered, but the sheets may lack the requisite strength and thickness to do the job for which they were purchased.

Four of the tests most commonly applied to show the strength of kraft paper are those for tensile strength, bursting strength, folding endurance and resistance to tearing.

The load required to pull a strip of kraft apart is called the tensile breaking strength. One of the most popular instruments for this test is the Schopper tensile tester, which is capable of measuring separately both tensile strength and stretch. A tensile-strength test is significant to buyers and users of kraft paper because it measures the durability and serviceability of papers which will be subject to direct tensile stresses.

The tearing strength of papers is generally determined by use of the Elmendorf tester, which measures the amount of stress necessary to tear specimens cut to a standard width.

One of the oldest tests used for measuring the bursting strength of paper is the Mullen test. It measures in pounds the force necessary to burst a surface area of 1 sq. in.

The folding endurance test is considered the best measure of the wear resistance of paper that will be subject to constant handling or considerable creasing and folding. In testing, a strip of paper is clamped under tension between two sets of jaws and folded until ruptured.

Machine-finished kraft wrapping paper comes in three grades—standard, No. 1 and superstandard. These grades differ mainly in bursting strength. No. 1 kraft has greater overall tensile strength, resistance to bursting and resistance to tear than standard kraft, while in superstandard, the tensile strength and resistance to tearing and bursting are even greater.

Kraft paper is a basic packaging material and has many more uses in the packaging field than can be enumerated here. In one form or another kraft is used by virtually every important product made in this country. It is suitable for any packaging job where an extra-strong pliable paper is needed—for lightweight and multiwall bags; wrappers, linings and base stock for boxes or cartons; corrugated constructions; gummed tapes; board.

To do specific jobs, kraft paper may be saturated, treated, laminated, coated or impregnated with various chemicals and other substances. Special processing produces kraft papers that offer protection against one or more of the following: water, moisture, oil, grease, mold or attack by chemicals. Grades can be procured that have wet strength, are noncorrosive or are rust inhibiting. Kraft stock can be reinforced with various fibres, it may be creped or treated to provide flexibility, sealability and other characteristics that may be required.

Glassine and Greaseproof

In the paper industry, the term *greaseproof* has been accepted and is used to designate a nonporous, extremely dense, translucent (if not purposely opaqued) type of paper that is made from only the highest grade wood pulps and is produced by papermaking processes that render it resistant to grease, fat and oil. The important thing to remember about greaseproof is that its unique greaseproof quality is inherent in the paper itself, because of the manner in which it is made.

Glassine is greaseproof paper that has received further processing involving high moisture content, high temperature and pressure applied by a specially designed multiroll, supercalender stack. This makes glassine even more dense, more smooth and more greaseproof than the original greaseproof stock from which it was made. In short, glassine is a highly finished greaseproof paper—a particularly hard, dense sheet with a somewhat glass-like surface—which can also be made highly transparent if the end user wishes. Some grades, of course, are purposely opaqued.

About 20% of the greaseproof paper is sold as such; the remaining 80% is made into glassine paper and in turn much of this is waxed, lacquered and otherwise converted.

Glassine and greaseproof papers abound in the properties needed in modern packaging. That is the reason they are so closely identified with the rise of modern convenience products packaged for greater protection and ease of use in better, quicker-moving, self-selling packages. These papers can be readily "engineered" to perform a variety of packaging jobs,

ranging from simple, low-cost protection to complex, multi-function performance, and their softness and flexibility—achieved by the addition of specially formulated plasticizers—make them adaptable for use on high-speed machines.

Highly moistureproof—when coated, laminated or waxed—and inherently greaseproof, glassine and greaseproof papers keep aroma in and odors out, exclude bacteria, aid in the retardation of mold, help prevent rancidity, withstand scuffing, have excellent strength and converting characteristics.

There are more than 200 different forms in which the "tough beauty" of glassine and greaseproof can be found at work on the housewife's shelves. And, in addition, there are equally as many important applications for these papers in industrial and military packaging because these functional papers meet basic packaging requirements, including Government specifications.

Glassine and greaseproof papers are universally employed as wrappers, liners, bags within cartons, bag liners, overwraps, bags or envelopes and as a component or accessory material for applications in many fields—for example, the glassine cups for chocolates; the inner wraps for hams; the glassine bags for potato chips, salted peanuts, and other snack foods; the waxed laminated glassine bags for prepared baking, pudding or ice-cream mixes; liners for coffee bags; the inner supplementary seal for soluble coffee packed in glass jars; the recipes printed on opaque glassine that are inserted in prepared-mix boxes.

Products that are important users of glassine or greaseproof papers include candy bars, cereals, prepared cake mixes, sugar, pharmaceuticals, hospital supplies, snack foods, meats, frozen foods and industrial parts. It will be noted here that many of the products employing glassine or greaseproof have critical flavor problems, grease- or oil-retention problems or call for sanitary, sterile protection and that these papers fulfill these needs because of their functional qualities as well as their versatility.

TYPICAL PACKAGING USES OF GLASSINE AND GREASEPROOF PAPERS

Grade	*Type*	*Packaging application*	
		Product	*Packaging form*
GLASSINE	Transparent Colored Opaque	Candies, cookies Snack foods Coffee, cocoa, tea Medicinal products	Bags, envelopes Bon-bon cups Wrappers, liners Labels Release paper Separator paper
WAXED GLASSINE	Amber Bleached Opaque	Bread, cakes, crackers Cereals Snack foods: corn, potato chips Metal goods	Wrappers Heat-seal liners Glue-sealed bags
SOLVENT-COATED GLASSINE	Cellulose nitrate Cyclized rubber Butadiene styrene copolymers Vinyl copolymers	Snack foods Tobacco Bakery items Cosmetics Ground coffee Frozen foods	Heat-seal bags, wrappers, envelopes Cap liners Container liners Labels
EXTRUSION-COATED GLASSINE		Medicinal powders Chemicals Soap, detergents Metal goods	Heat-seal envelopes Wrappers
WAX-LAMINATED PAPERS	Glassine to glassine Glassine to kraft Glassine to foil Glassine to boxboard	Pie, candy, cake mixes Dessert powders Metal goods Frozen meat, poultry Chewing gum Baked goods Powdered coffee	Carton liners Wrappers
SOLVENT-LAMINATED PAPERS	Glassine to glassine Glassine to foil, solvent coated	Soup mixes Beverage powders Medicinals Dehydrated foods	Fibre-can liners Heat-seal envelopes
GREASE-PROOF	Bleached Opaque	Candies, bar goods Butter, lard, oleo Bakery goods Ham, bacon, etc. Metal parts	Liners Wrappers Labels Bags, envelopes Interleavers

Greaseproof paper

Many papers have greaseproof properties. "Greaseproof," meaning a type of paper, refers to paper made from special sulphite pulps that have undergone a long, slow cooking. These pulps are given an intensive mechanical treatment or beating, thereby driving water into the cellulosic fibres and producing a more homogenous, gelatinous fibre mass. This change in fibre character is called hydration. This mass of fibres, when formed into a sheet on the fine wire of a greaseproof-paper machine and dried becomes extremely dense. The highly hydrated nature of the fibres of the sheet keeps greases and oils from penetrating, and from this derives the property of greaseproofness.

The same physical characteristics which give this sheet its inherent greaseproof property also enable it to perform other functions. Greaseproof paper is primarily dense—a quality that also makes it odorproof on two counts: it retains odors and aromas, and is therefore used to package such products as coffee and fine soaps. On the other hand, it excludes undesirable odors, making it an excellent medium for the packaging of lard, butter, oleomargarine and shortenings.

Greaseproof is widely used in the packaging of ham, bacon, veal, pork, sausage and similar foods with a high fat content, as well as for pickup sheets, pan liners, release papers and carton liners in the bakery industry.

Greaseproof paper can be given high wet strength and wet-strength greaseproof is excellent for packaging foods that are both fatty and wet.

Greaseproof is also extremely use-

PHOTO THIS PAGE COURTESY GLASSINE AND GREASEPROOF MFRS. ASSN.



Glassine is a component of the package for all of these well-known products—as an outer wrap, inner wrap, liner or secondary closure. Glassine performs an extremely wide range of protective chores and performs them well.

ful in that it supplements the good qualities of many other materials—it combines with paperboard as a liner to produce greaseproof boards; it can be laminated to foil, kraft papers and films, and to itself, to do specialized protective chores in packaging.

Greaseproof can be obtained in varying degrees of pH—either neutral or in the acid and alkaline grades. Adjustment of the pH, for example, permits the manufacture of anticorrosive greaseproof wraps for highly polished metal parts.

Greaseproof is marketed on a cents-per-lb. basis. The normal basis weight range is 18 to 45 lb. per ream of 500 sheets 24 by 36 in.

Glassine paper

Glassine is available in various weights and degrees of clarity. Certain basic relationships among the properties of glassine are important in packaging and are summarized as follows:

1. The degree of greaseproofness is dependent primarily upon the hydration that the pulp receives and secondarily upon the degree of supercalendering given the greaseproof stock.

2. Given a constant weight of glassine, an increase in greaseproofness is accompanied by an increase in transparency.

3. An increase in greaseproofness also results in an increase in bursting strength and in a decrease in tearing strength.

4. Improved greaseproofness usually means a harder, stiffer paper. To overcome this, plasticizers are incorporated in the greaseproof paper. The degree to which the resultant paper is more pliable depends upon the type and quantity of plasticizer.

5. Greaseproofness and strength characteristics increase with weight, while—all other factors being constant—transparency tends to decrease with increases in weight.

Glassine and greaseproof papers are available in various colors and degrees of opacity, which is of interest from an artistic as well as a protection standpoint. Certain colored and opaque papers, being more resistant to the transmission of ultraviolet light, have high antirancidity properties.

The majority of papers are made from an acid medium which results in mildly acid papers that have a pH of 4.0 to 5.0. Glassine paper, however, can be made neutral at a pH of 7.0 and such paper finds its main use as an anticorrosive wrap. Glassine and greaseproof papers may be treated with water-repellent agents to retard penetration of liquids and provide good release properties. They also may



Duplex glassine and greaseproof are teamed for exacting protection.

Boxboards used in packaging—

Grade of Board	Uses	Contents	Caliper Ranges[1]	Finish in Points
Plain chipboard Solid newsboard News vat lined chip Filled news	Primarily in the manufacture of set-up boxes for candy, stationery, gifts, textiles, etc.	100% low-grade waste papers (news, mixed to corrugated)	0.020 to 0.060	2,200 to 2,400
White wood vat lined chipboard	A higher grade set-up box with a white liner.	White liner is 100% groundwood. Back is same as chipboard.	0.020 to 0.060	2,100 to 2,400
Bending chip	Boxes for packaging light items, such as cigarettes, toiletries, pastry, suit boxes, medical supplies.	100% waste papers of the low grades (news, mixed, corrugated)	0.016 to 0.034	1,800 to 2,100
Colored Manila-lined bending chip	Same type of packaging as bending, where more eye appeal is desired.	Top liner is virgin pulps or high-grade waste-paper substitutes. Back is same as bending chip. Does contain some groundwood in top liner.	0.016 to 0.034	1,800 to 2,000
Bleached Manila-lined bending chip	Packaging items where more eye appeal is desired using 2- & 3-color print jobs.	Top liner is high-grade waste and virgin sulphite pulp. Contains some groundwood. Back is usually news or chip.	0.016 to 0.034	1,800 to 2,000
White patent-coated newsback	Folding boxes, displays, posters, shirt & textile inserts, collars, sleeves, etc.	Top liner is 100% virgin pulps & high-grade wastes. Free of groundwood.	0.016 to 0.034	1,700 to 1,900
Clay-coated board	Boxes or display pieces wherever extremely high-grade, multicolor printing is needed.	Same as white patent-coated newsback except for clay-coated liner.	0.016 to 0.024	1,700 to 1,900
Solid bleached sulphate board	Foodstuffs – frozen foods, bakery boards, ice-cream board.	100% virgin sulphate pulps.	0.012 to 0.026	Determined by lbs. per 1,000 sq. ft.
Unbleached solid sulphite board	Food, hardware, toys, automotive and mechanical parts where more eye appeal is desired.	100% virgin pulps.	0.012 to 0.026	1,700 to 1,900
Solid Manila board	Same as above, except food.	Virgin pulps & high-grade waste substitutes.	0.012 to 0.030	1,700 to 1,900
Extra-strength plain kraft-type boards	Hardware, toys, automotive and mechanical parts.	Kraft waste and kraft pulps.	0.016 to 0.050	1,700 to 1,900
Extra-strength white-lined kraft-type boards	Same as above where more eye appeal is desired.	Kraft waste and kraft pulps.	0.016 to 0.050	1,700 to 1,900

[*] Prepared by Columbia Box Board Mills, Inc., Chatham, N. Y. [1] Caliper times the number of standard sheets per bundle.

types, uses, characteristics*

Grade of Board	Chief Characteristics	Brightness[2] Standard	Blending Qualities	Color
Plain chipboard Solid newsboard News vat lined chip Filled news	Lowest-cost board produced. Adaptable to special lining papers. Not good for printing. May be had in a variety of colors.	No standard	Poor	Ranges from light gray to tan.
White wood vat lined chipboard	The chief difference between this and plain chipboard is that it has a white liner adaptable to color and can be sized for printing.	55	Poor	Back is gray, top is white.
Bending chip	Lowest-cost board for folding boxes. Can be printed with all colors. Can also be manufactured in a variety of colors. Adaptable to special sizing and calender treatments. Takes 180-deg. bend.	No standard	Excellent	Usually gray or light tan.
Colored Manila-lined bending chip	Same as bending chip except for brighter liner. Comes in a greater variety of color.	Varies with color	Excellent	Very even colors on liner; back usually same as bending chip.
Bleached Manila-lined bending chip	Same as bending chip, except white top liner permits special treatment and multicolor printing.	58 to 60	Excellent	White top liner and newsback chip.
White patent-coated newsback	A smooth board, much whiter than any of the above grades. Colors are not subject to fading and it has considerable strength.	65	Excellent	Back usually gray.
Clay-coated board	A very smooth and white board providing an excellent printing surface.	70 to 80	Excellent	Top is white, back usually gray.
Solid bleached sulphate board	A strong board used in folding boxes where strength and good performance on automatic filling machines is needed. A very clean sheet.	70 to 80	Excellent	Solid white.
Unbleached solid sulphite board	A less-expensive board than solid bleached sulphate. Not so strong nor so bright but is just as clean.		Excellent	Buff shade.
Solid Manila board	Available with a white liner and Manilla back.		Excellent	Buff shade.
Extra-strength plain kraft-type boards	Maintains a minimum test on Mullen and tear; available in dark colors.		Excellent	Brown throughout the sheet.
Extra-strength white-lined kraft-type boards	Available in pastel shades; maintains minimum Mullen and tear tests.	60 to 75	Excellent	Top liner is white; filler and back, brown.

[2] Ratio of brightness of paper to brightness of magnesium oxide.

PHOTO COURTESY BERLIN & JONES CO.



Protective properties of papers cover practically the range of packaging requirements. This reusable kraft envelope lined with VCI protects precision tools from rust for long periods. Sturdy kraft also withstands handling by oily or greasy hands.

be treated with wet strength agents in order to retain their strength even when soaked.

Laminated glassine

To obtain added strength and made-to-order protective water-vapor quality, glassine is laminated to itself or other papers, films and foils. Thus for economic reasons and efficient handling on automatic equipment, it is often necessary that the surface of packaging papers be plain and not coated. When low water-vapor permeability is required it can be obtained by laminating two sheets of glassine with microcrystalline wax or with other types of laminants applied by hot-melt methods or by solvent application. Solvent application, for example, is the method generally used to combine foil to glassine.

The wax-laminated types of glassine have excellent flexibility and moldability. Wax-laminated types are ideally suited as carton liners for a wide variety of articles as indicated in the accompanying table of typical packaging uses.

The ultimate in water-vapor protection is obtained through the use of a coated, laminated glassine. This surface coating may be either paraffin wax or one of the water-vapor barrier solvent coatings.

Glassine, besides being of value as a wrap in itself, has the added feature of being an ideal paper to combine with films and foils, thus giving combined qualities having advantages not available in any single material. See "Laminated Materials," p. 138.

Coated glassine

Because of its smoothness and density, glassine paper is an excellent base sheet for coatings having special properties such as heat seal, gloss and water-vapor, impermeability. See article, "Protective Coatings for Packaging," p. 72. One of the most economical coatings is refined paraffin wax, which has found widespread usage. Almost all moistureproof coatings, whether lacquer or hot melts, depend upon wax for this quality. Glassine coated with 100% paraffin wax has top water-vapor permeability properties.

Lately, paraffin wax has been modified with film formers and resins to improve its gloss and heat-seal properties. These are often known as modified waxes or hot melts and are of importance to the operational properties of the packaging material. For example, if the packager wants the most economical high water-vapor barrier material available, he is bound to consider glassine. However, on automatic equipment it may be necessary to obtain improved sealing; thus, a modified wax may be called for. Again, the wax coating may not be sufficiently durable or scuff resistant and must be modified to make a harder type of film such as that produced by solvent coatings.

PHOTO COURTESY PATERSON PARCHMENT PAPER CO.



Special holiday promotions of gift hams or bacon sides represent an increasingly popular outlet for two-color lithographed vegetable parchment.

Vegetable Parchment

by Everett S. Worth*

The preparation of vegetable parchment involves two steps. The first is the manufacture of the base absorbent paper, called waterleaf. The second is the parchmentization of the waterleaf by a carefully controlled sulphuric-acid treatment and washing. When waterleaf is exposed to the action of the acid, the fibres of the paper are attacked, forming a film of gelatinous cellulose which covers the fibres and fills the interstices of the sheet. This bonds the fibres so they cannot be de-fibred on immersion in water. Careful washing removes the acid, producing a near-neutral sheet of vegetable parchment.

Since its earliest days, vegetable parchment has been used as a butter wrap and also as a liner for bulk-butter cartons and boxes.

The water-vapor transmission rate of vegetable parchment is in direct proportion to the treatment given after processing. It is available with coatings to prevent undue moisture

(*This article continued on page 63*)

* Chief Chemist, Paterson Parchment Paper Co., Bristol, Pa.



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FOR COOK
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FLORIDA
SHEPARD'S TUNA
SELECT EARLY JUNE PEAS
FINEST



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Keep *YOUR* products moving from retail shelves to the home kitchen . . . by using labels and/or matching box wraps of Colorcast Drum Finished paper. Its clear, brilliant, fast to light colors provide the impact you need for modern selling.

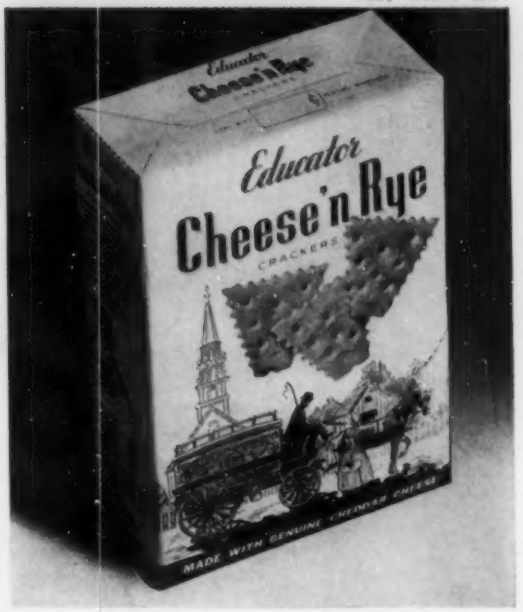
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Waxed papers with their excellent moisture and freshness retention properties have the additional advantage as packaging materials of high-grade printability. Wrap pictured here is one-side waxed, with the dry side glued to the carton for proper moisture balance.

ss. For more than 65 years its greatst outlet has been in the packaging nd protection of food perishables requiring a non-toxic, odorless and tasteless wrap which at the same time is reaseproof and of high wet strength.

Vegetable parchment varies in rice according to type. Often a ghter weight can be used to give qual or better protection than eavier weights of other materials. here are approximately 200 different ypes available, a large number of hich serve various functions.

Vegetable parchment can be obtained in sheets of all sizes and shapes as well as in rolls of almost any width and length, translucent or opaque, coated or uncoated, or laminated to foils and films. It is sold in weights of 18 to 110 lb. per ream of 500 sheets 24 by 36 in.

A coated type of vegetable parchment for use in locker plants and frozen-food packages is available. Special bags have been produced for food packaging to contain various components of the package, such as the bag for grated cheese in a macaroni dinner package, or for giblets tucked in dressed fowl.

As a supporting membrane for foil, vegetable parchment has been used in wrappers for oleomargarine, butter and cheese. This combination meets all necessary requirements of an ideal wrapper, functionally and saleswise.

Grades of vegetable parchment are available which are impervious to air, oxygen, nitrogen and carbon dioxide. These are grades of medium weight, well parchmentized, and they should be plasticized if they are to be used in other than flat form.

Because of its greaseproof properties, vegetable parchment, when laminated to boxboard, serves many uses as liners of bakery boxes, oil containers and various other packages.

Among some of the newer developments are silicone and other treated vegetable parchments which have antisticking or release properties or anticreep properties to prevent the spread of oil. Vegetable parchment treated for releasing can also be used as an interleaving sheet for frozen cut meats and hamburger patties. A releasing type is now being used for lining the box in which brown-'n'-serve rolls are sold for baking by the customer after purchase. The rolls release easily from the treated parchment surface, thus making possible a type of merchandising formerly very troublesome to the packager. As a separator sheet for unvulcanized and semi-vulcanized rubber, releasing parchment is also doing a fine job.

All vegetable parchments take printing beautifully by letterpress, offset or gravure. Manufacturers' brand names and intricate designs can be printed in several colors.

Waxed Paper

by Carl E. Rogers*

Waxed paper is widely used in packaging food products because it provides excellent product protection at relatively low cost and because it meets the exacting requirements of modern food merchandising in self-service grocery outlets.

There are three basic types of waxed paper, each of which has its own characteristics and field of usefulness: (1) wax-emulsion papers (moderate wet strength); (2) dry-waxed paper (medium-range performance); (3) wet-waxed paper (which can be processed to provide excellent protection and heat sealability).

The base material used in most waxed-paper coatings is paraffin wax. New additives, such as polyethylene and microcrystalline waxes, are now being used in varying quantities to increase the qualities provided by the regular waxes. The resulting higher seal strength, greater moisture impermeability, higher melting point and improved low-temperature flexibility have opened up many new fields for the use of waxed paper in packaging.

Waxed paper is sanitary, odorless, tasteless and non-toxic. These properties, improved printing processes and paper stock, plus the new coatings, have contributed to the extensive use of waxed-paper packaging for such highly perishable products as bread, frozen foods, cookies and crackers, cereal, candy, butter and ice cream.

Opaque waxed paper prints beautifully and lends itself to the effective use of color and design to achieve strong brand identification for a product. It is important, too, where faithful product reproduction in color is required, as on frozen-food overwraps or cookie wrappers. The new high-gloss coatings containing polyethylene also add eye appeal.

Waxed paper finds many applications unprinted—in the form of cracker package liners, cereal bags, carton liners for sugar and "mix" packaging, because it gives good water-vapor protection at relatively low cost.

Waxed paper is often used in roll form on high-speed automatic packaging machines. It has good dimensional stability, doesn't crack when cold or dry and doesn't stretch under hot and humid conditions.

Several grades of sulphite papers and glassine are the base stocks most widely used in the production of consumer-packaging waxed papers. A high degree of opacity in new sulphite

* Lever Brothers Co., New York, formerly Director of Marketing, Waxed Paper Institute, Chicago.

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waxing stock has been an importa… development. Glassine is often chos… as the base stock for cracker and … real carton liners and also is used … substantial volume where semitra… parency is desired, as in potato-ch… bags and wrappers for specia… breads. The nonscuffing qualities … these waxed glassine wrappers … good. The greaseproofness and hi… finish of glassine provide an excelle… base for waxing, which increases t… transparency and moistureproofne…

For industrial packaging and f… in-plant use, kraft papers are oft… selected as base stocks for waxing.

Tissue Paper

by Bernard S. Aa…

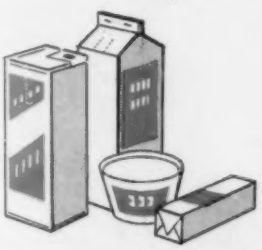
There is now available a great v… riety of tissue papers under t… broad definition of wrapping tissue… Tissues are adaptable to the packa… ing of an almost unlimited list of a… ticles. Their use is especially impo… tant in preserving the original, ne… made condition of articles.

The soft, textural appeal of tissue … a characteristic unique to this mat… rial. As a packaging component … automatically invites examination … a product and at the same time i… plies special regard on the part of t… packager for his product. For th… reason, tissue suggests luxury, qualit… precision or individuality and th…

(*This article continued on page 6…*

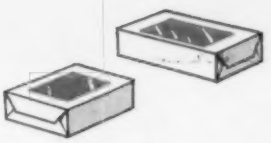
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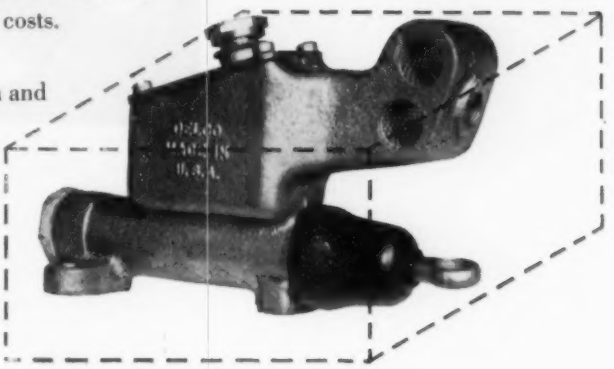


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tly enhances the sales appeal of article. Moreover, tissue is the ans, in many instances, whereby manufacturer's brand and sales y are emphasized right up to the nt of use.

sic types

Tissue papers used in most commercial applications are lightweight des, ranging from 10 to 20 lb. basis ght (480 sheets, 24 by 36 in.). wever, some products of a delicate ure require even lighter basis ights, that is, sheets weighing wn to 5 to 6 lb. per ream.

Tissue qualities range from the eapest type of stuffing or packing sues to the many strong sulphite d sulphate papers, unbleached or eached, the anti-tarnish and nonrrosive grades; the colored and corated lines; and a number of ecialty sheets, made of special fies, for certain specific uses which, a broad sense, can be termed nonmmercial products. In most inances, tissues are furnished in eets, that are (1) folded and quired (2) flat in bundles or cartons, ream rked or ream sealed, depending on the use. Standard or special sizes n be obtained.

There are different finishes, maine finish (M.F.), and machine aze (M.G.), and these finishes can changed and altered in the course manufacture to provide tailored-toder properties.

The growing use of tissue by many anufacturers and producers in the ckaging of their products has used packagers to view tissues in a w light and consider them as an tegral part of the over-all program at takes both inner and outer packging into account.

For there are many ways in which e tissue can be made to conform to e box, carton or container, in either ain sheets or a printed design or olor, making the entire package uniorm in appearance. Eye appeal thus enhanced and a better impression is nveyed to the customer. Moreover, e cost per sheet of tissue is small.

pplications

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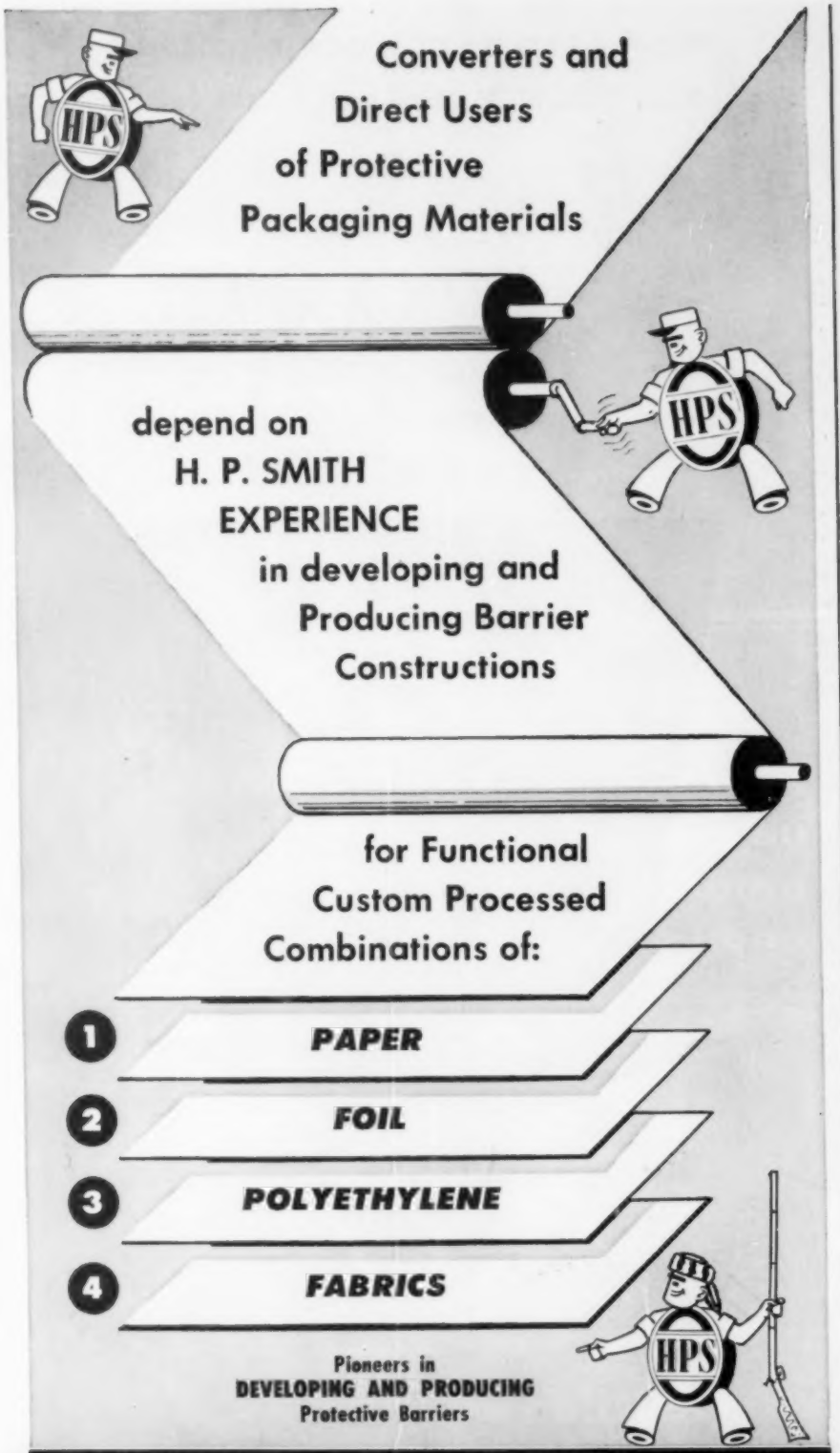


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package. Many examples of effective use point the way to additional potentially salesworthy applications.

Manufacturers of handbags selling in the higher-priced brackets, have found it of great value and aid in their sales to use black, lintless tissue in the packaging of suede leather and fabric bags. Similarly, matching or contrasting colored tissues are used effectively in colored bags.

The makers of shoes, lingerie, hosiery, millinery, blouses, shirts, men's hats, gloves, handkerchiefs, costume jewelry and a host of other items of wearing apparel, have adopted either plain or printed tissue as an integral part of their packaging, because it not only protects these products but also improves their presentation.

Tissue is also widely used to protect and help merchandise household appliances, electrical products and devices, clocks, cooking utensils, glassware and crystal stemwear, brass and other metal commodities, cutlery, hardware, objects of art, souvenirs, pens and pencils, and the like.

Color coding

A neglected yet fertile field among the sales opportunities tissue affords is the use of the colored and specialty tissues as a functional help in the presentation of the product. For example, a number of manufacturers of abrasive stones and wheels have found different colored tissue wraps a great help in identifying their various products for easier storage, selection and end use. Makers of faucets, articles with left- and right-handed threads, various sizes of nuts and bolts, tools, etc., have also adopted colored tissues to identify their products.

The fast-growing field of polished equipment, such as stanless steel, chrome finish and other metal products, has been using ever-growing quantities of both the colored and the noncorrosive grades of tissue for protection and eye appeal. The field of cosmetics and jewelry, perfumes and other so-called luxury items—where the packaging and presentation of the object are important details in making the sale—is a good place to observe how tissue can be used best.

For some time now the laundry and dry-cleaning trades have used colored tissues to denote and emphasize the quality of their work. Manufacturers of white goods, such as cottons and linens, find that certain tissue colors heighten the whiteness of the article.

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Protective coatings for packaging

by PAUL K. WOLPE

Protective packaging coatings form one half of an inseparable partnership with support materials such as paper, paperboard, metallic foils and synthetic films. Combinations of coating materials and support materials provide a widely diversified group of packaging materials for many of today's flexible packaging end uses.

As their name suggests, protective coatings have the basic purpose or function of protection. Quite apart from this basic function, the protective coatings have what may be defined as a material function which operates to change or adapt the fundamental characteristics of the support material or substance to a more useful form.

The protection and material functions of the packaging coatings may be listed as follows:

Protective Function (against)

1. Water
2. Water vapor
3. Gases (O_2 CO_2, etc.)
4. Odor and taste changes
5. Greases (fats and oils)
6. Chemicals (acids and alkalies)
7. Organic solvents

Material Function (creates)

1. Heat sealing
2. Blocking resistance
3. Optical (gloss, shine, clarity)
4. Durability (scuff or mar resistance)
5. Release properties

Before considering protective coating materials specifically, it may be well to comment on the role played by the support material, as this must be taken into account in the selection of the proper packaging material for a given end use. At the risk of oversimplifying a complex relationship, it may be stated that the density and finish of the substrate material are determining factors in the amount of coating that must be applied to produce a coating film of the desired characteristics. This is particularly true of paper and paperboard substrates. The strength of the substrate is also an important factor. For example, for this last reason, lightweight foils cannot be coated unless backed with some other material, generally paper, in spite of the fact that the density and finish of foil are most satisfactory for coating purposes.

Relative incompatability of the substrate and coating material must also be considered if the substrate is a synthetic organic film. In the same class, although not strictly examples of incompatability, are glassine and vegetable parchment which are lyophobic or greaseproof papers. These papers provide better surface holdup for coatings than most papers because of this inherent property.

It is convenient to classify protective coatings on the basis of the means of their application to substrate materials rather than on their chemical composition or physical properties. Thus, three fundamental groups of protective coatings may be listed:

1. Wax coatings (including hot melts)
2. Solvent coatings (including organosols and plastisols)
3. Extruded coatings ("plastic films").

Wax coatings

Wax coatings are the oldest group of protective packaging coatings in use today. There are three classes of these coatings based on composition and general properties:

1. 100% refined paraffin-wax coatings
2. Modified refined paraffin-wax
3. Hot-melt coatings.

Paraffin wax, 100% refined. Paraffin wax, originally a by-product of the petroleum industry, has proved to be the workhorse material in the field of protective packaging coating. It is a low-cost material and available in good supply. It is chemically inert and non-toxic, properties that are advantageous in food packaging. Paraffin-wax films are highly water and water-vapor resistant, comparing very favorably in this respect with all other coating materials.

Paraffin-wax coatings are applied from the molten state with high-speed waxing equipment, using a combination of rubber and steel squeeze rolls. Wax films can be applied in a wide range of ream weights (lbs./3,000 sq. ft.) depending on the substrate material, waxer speed, wax temperature and rubber-roll density. For example, waxing-grade sulfites may carry from 10 to 20 lbs. or more wax per ream, while waxed-glassine grades range from 2 to 10 lbs. of wax per ream.

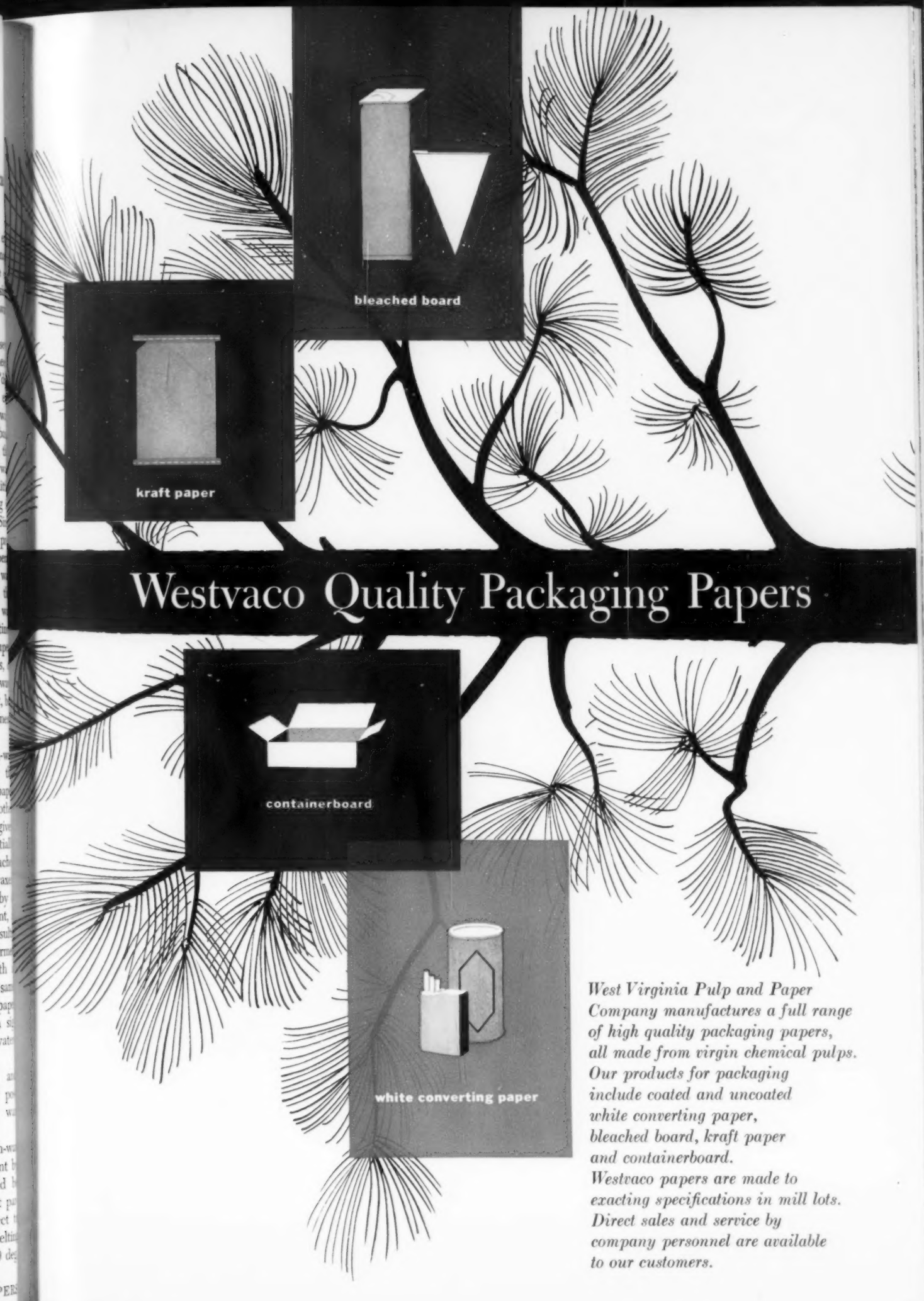
In considering wax coatings, several terms used in the trade may need explanation. There are the terms "dry waxed" and "wet waxed," for example. If a limited quantity of wax is applied to a relatively porous base paper at a high temperature and the waxed paper wound up hot, the wax will saturate the sheet leaving little or none on the surface, resulting in the so-called dry-waxed paper. Similarly, a "wet-waxed" sheet is prepared by waxing at lower temperatures, followed by chilling the wax film prior to winding cold off the waxer. In this case, most of the wax remains on the surface as a continuous film. Machine finish (MF) or supercalendered (SC) sulfites or krafts, boards, may be waxed either way. Glassine and vegetable parchment, because of density and greaseproofness, can be "wet waxed" only.

The rate at which the molten-wax film is cooled not only affects the penetration of the wax into a paper substrate but also affects the other properties of the wax film. A given wax film on paper will be partially cooled and solidified before it reaches the chill rolls at the end of the waxer. If the paper is quick chilled by a cold-water fountain at this point, a film of extremely high gloss results. A waxed paper so prepared is termed "water waxed." Compared with a regular wet-waxed paper of the same composition, the water-waxed paper has a much higher finish but a significantly poorer degree of water vapor resistance.

In general, "dry," "wet" and "water" waxing operations are possible with all three classes of wax coatings.

The advantages of paraffin-wax coatings are offset to some extent by other characteristics that should be noted. Paraffin-wax films are not particularly durable and are subject to marring or scuffing. With melting points in the range of 122 to 150 deg

* Riegel Paper Corp., Milford, N. J.



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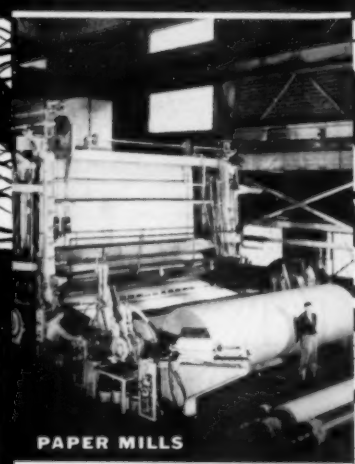
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TECHNICAL SERVICE

paraffin-wax films readily block under temperature conditions which can prevail in transport in the summertime. Though this can be overcome by the use of refrigerated cars or vans, blocking resistance remains a problem under other conditions. It is significant that the terms blocking and blocking resistance originated in the waxed-paper field because of the similarity in extreme cases of blocked waxed paper to a block of wax. Blocking resistance is an important characteristic, not only because of end-use difficulties, but also because the optical and other film properties are considerably affected.

The melting-point ranges of refined paraffin wax suggest the relative ease of heat sealing coatings of this material. However, because of the low cohesive strength of paraffin wax, heat seals are not strong enough to permit complete dependence upon them for package fabrication. Adhesives are generally used for bottom and side closures when bags or envelopes are fabricated. Waxed papers used as carton wraps or liners have heat-seal strength adequate for these functions and adhesives are not generally required.

Modified paraffin-wax coatings. This class of coatings originated as a logical development of the unmodified paraffin coatings. Every formulation in this category has been developed on the principle of eliminating or correcting the deficiencies of refined paraffin-wax coatings while still maintaining the extremely desirable properties of paraffin wax.

Roughly speaking, the modified paraffin-wax coating will contain up to about 10% by weight of the modifier. The most common modifiers used today include microcrystalline waxes of various softening points, butyl rubber, polyisobutylene, polyethylene and other resins. The modifiers are blended with paraffin, either singly or in combination, for the purpose of improving heat-seal strength, gloss and film durability. The modifiers must be used with discretion, for as their concentration in the wax blend increases beyond the rough limit indi-

PROPERTIES OF PROTECTIVE PACKAGING COATINGS

Coating material	*Base material*	*Wt.-lbs./3,000 sq.ft.(reams)*			*Heat-seal range, °F (reciprocating jaw, 0.5-sec. dwell)*	*Water-vapor permeability, Grams/100 sq.in./24 hrs. 100°F-90% R. H. uncreased*	*Grease[1] resistance*
		Coating	*Base*	*Total*			
ax Coatings							
Refined paraffin wax							
	MF sulfite	5	25	30	—	High	Poor to fair
	SC sulfite	10	25	35	150-180	0.7-2.0	Fair
	Glassine	4	25	29	150-180	0.2-0.4	Good
	Glassine	6	25	31	150-180	0.1-0.2	Good
Modified paraffin wax							
	SC sulfite	10	25	35	150-180	0.7-2.0	Fair
	Glassine	8	25	33	150-180	0.1-0.2	Good
Hot-melt types	SC sulfite	10	25	35	200-350	High	Fair
lvent Coatings							
Cellulose nitrate	SC kraft	8	32	40	200-300	0.8-1.2	Good
	Glassine	3	22	25	200-300	0.4-0.8	Good
	Regenerated cellulose	2	20	22	200-300	0.2-1.0	Good
Cellulose acetate	SC kraft	5	25	30	300-400	High	Very good
Cyclized rubber	SC kraft	8	32	40	200-300	0.6-1.0	Fair
	Glassine	3	22	25	200-300	0.15-0.25	Good
Butadiene-styrene	Glassine	3	22	25	200-300	0.15-0.25	Good
Vinyl copolymers	SC kraft	5	25	30	220-280	4.0-6.0	Good
	Glassine	3	22	25	220-280	2.0-5.0	Good
Extruded Coatings							
Polyethylene 0.5 mil	MF or SC kraft	8	25	33	200-300	2.5-3.5	Fair
1.0 mil	MF or SC kraft	15	25	40	200-300	0.8-1.0	Good
2.0 mil	MF or SC kraft	30	25	55	200-300	0.6-0.8	Very good
0.5 mil	Foil - glassine	8	42	50	200-300	Less than 0.02	Excellent
Saran 1.0 mil	MF or SC kraft	26	25	51	325-350	0.20-0.25	Very good
2.0 mil	MF or SC kraft	39	25	54	325-350	0.15-0.20	Very good

[1] Depends on type of grease and other factors.

cated above, the original paraffin-wax properties such as water-vapor resistance may be seriously degraded. More obvious is the fact that modifiers as a class are more expensive materials than paraffin wax, so that their increased use raises the cost of the basic coating material. Further, the use of modifiers in high concentrations may significantly slow waxing speeds, which also operates to increase cost. It can be seen that the use of modified paraffin-wax coatings requires a compromise on the part of the converter and user between functional, operational and economic factors in selecting the optimum coating for a given end use.

Modified paraffin-wax coatings are applied on the same type of waxing equipment as the refined paraffin-wax coatings. Within the limits already described, the modified wax coatings commercially available retain the general level of water-vapor resistance of unmodified paraffin wax. At the same time, the heat-seal quality of the modified wax coatings is improved and they may be used on automatic equipment without special adhesives.

Hot-melt coatings. The last class of wax coatings includes all formulations of wax and modifiers where the concentration of modifiers exceeds 10% by weight. Though this is an arbitrary classification, the hot-melt coatings are always highly modified wax blends, containing the modifiers previously mentioned plus other types including ethyl cellulose, cyclized rubber and butadiene-styrene copolymers. Hot-melt coatings differ from the modified paraffin-wax coating not only in composition but also in application and properties.

Special equipment is required to apply hot-melt coatings, since temperatures varying from 250 to 400 deg. F. are required to bring the melt viscosity within practical operating values.

Hot-melt coatings are characterized by extremely strong heat seals and fair blocking resistance. The coatings are more durable than the paraffin-wax types and can be made with good gloss and clarity. The water-vapor transmission rates of this class of coatings are generally higher than those obtained with the paraffin-wax types.

Solvent coatings

Solvent or lacquer coatings may be classified broadly by the type of solvent system employed, as follows:

1. *Organosol*—a resin and plasticizer combination dispersed in a mixture of organic liquids of the polar and nonpolar types. The polar liquid acts as the dispersant or solvent, while the non-polar liquid acts as the diluent.

2. *Plastisol*—a resin dispersed in a suitable liquid plasticizer.

Since most of the commercial "lacquer" coatings available today for packaging purposes are of the organosol type, an alternate classification by chemical identity may be preferable. This listing can be subdivided into thermoplastic and thermosetting types. For all practical purposes, this subdivision is based on heat-sealing or non-heat-sealing characteristics of the respective coatings.

The heat-sealing quality of the thermoplastic types of solvent coatings is without exception very good, while the companion quality of blocking resistance is also good. In both respects the solvent coatings are superior to the wax-type coatings. Because of their strong positive heat seals at temperatures ranging from 200 to 300 deg. F., this class of coatings made many new types of packaging materials available for use on automatic equipment.

In addition to these qualities, both types of solvent coatings are characterized by their durability, gloss and clarity. These characteristics recommend solvent coatings for use as overprint coatings on label stock as well as with printed flexible-package materials. Many of the coatings are resistant to water vapor to a high degree.

Cellulose nitrate. This material has been used successfully for a longer period than any other solvent coating. Characterized by good grease resistance, it can be formulated with varying degrees of water-vapor resistance by the addition of small quantities of paraffin wax. Cellulose-nitrate coatings are probably the least expensive of the solvent coatings and have had the widest use on all types of paper. Cellulose-nitrate coatings are the principal protective coatings used on cellophane.

Cellulose acetate and other cellulose derivatives. These materials are used for special purposes only, for they are not water-vapor resistant to any degree. They are materials which form tough, durable films of high clarity and good grease resistance.

Cyclized rubber (natural rubber). This material combines excellent water-vapor resistance with remarkably strong heat seals over a wide range of temperatures. The sealing quality requires special precautions, such as the use of silicone or Teflon on heat-sealing jaws of packaging equipment.

Butadiene-styrene copolymers. Synthetic rubber coatings possess the excellent water-vapor resistance and heat-sealing properties found in natural rubber coatings but pose fewer operating difficulties on packaging equipment, as no special release materials are required on sealing jaws. However, like the natural rubber coatings, the grease resistance of the butadiene-styrene coatings is not so good as some of the other solvent coatings.

Vinyl copolymers. Quite a number of different vinyl copolymers are available today. They differ in minor respects, but all possess good grease resistance. The vinyls are not considered highly moistureproof coatings, but they occupy a middle ground in this respect between the rubber polymers and the cellulose derivatives other than cellulose nitrate.

Extruded coatings

These coatings form the last basic group of our classification scheme. As a group, extruded coatings have made a definite impact in packaging, extending the scope and concept of unit packaging into many new fields. At the present time, polyethylene and polyvinylidene chloride (saran) have been the principal materials used for extrusion coating. Polyamide resin extrusion, now being developed in the pilot-plant stage, shows promise of interesting and useful properties.

The fundamental advantage of this type of coating is that it makes possible the use of thin films of materials, whereas unsupported film may be relatively costly and hard to handle. Where unsupported films of more than 1-mil in thickness were formerly required, it is possible to extrude films of less than 0.5 mil on various low-cost types of substrates. Just as with the solvent and wax-type coatings, the substrate materials add their own properties to those of the plastic film used, creating new types of materials.

The extruded film coatings have created new values of strength and flexibility hitherto not attainable with coated materials. Their chemical inertness and grease resistance have made them particularly valuable in the packaging of metal parts, chemicals, drugs and cosmetics.

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- **#75 BRUSH FINISH**—A highly calendered boxboard, very resistant to soil and handling, that requires no lacquer or varnish for durable whiteness. Quite nominal in cost.
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- **METALLIC COATEDS**—Glittering silver, gold, and other metallic finishes that closely simulate expensive foils. For exceptionally attractive gift packages.



POLYETHYLENE COATEDS—Polyethylene combined with other materials in Poly-eon and Poly-Wax coatings for all types of protective, moisture-barrier packaging.

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Fancy papers

As a merchandising aid, paper comes close to being all things to all packagers. With easy adaptability it can say "high fashion," "homespun virtue," "strongly masculine," "ultrafemininity" or "softly protective" and so transform any product into an attractive luxury or gift item with a highly individual appeal. It is a low-cost material and it offers a panoramic selection of textures and colors. Paper can simulate lace, wood, fabric, leather, metal, straw; can be plain or patterned, dull or shiny, smooth or rough surfaced. Its wordless sales appeal can be used as background atmosphere or primary attention getter. Translated into past successes and present uses, this means fancy paper is at the top of the list of decorative packaging materials.

To keep pace with this important phase of packaging, printing and embossing facilities are constantly expanding and the available designs and combinations now range in the hundreds. In a normal year, new printed patterns in various new colors make their appearance along with a number of new embossed effects. In addition, paper designers attempt to coordinate gift papers with fashion trends in ready-to-wear, textiles, cosmetics and home furnishings. Rotation of older designs in five- or 10-year intervals and the ever-increasing adoption of private-design papers help to maintain the massive inventory.

Though used primarily as a decorative medium, the papers are available with grease- and moistureproof properties. This combination of functions is used to advantage in cosmetic, metal, jewelry, candy and food-specialty packaging.

Types of papers

All decorative papers involve a base stock and some finishing treatment or combination of treatments. Paper to be coated should be sized to give it a hard surface free from grooves or wicks. Color of the base stock is important only when coated with transparent films or for special-duty papers. Color stock may be specified to prolong sales life if frequent scuffing or hard usage is encountered.

Classification of decorative papers according to base stock and finishing treatments is as follows:

Flat or dull-finish papers may be coated or uncoated. In their uncoated styles, they may be given a natural finish, an antique, "rough" or "rag content" look, but they are ready for printing without additional surfacing. Casein- and clay-coated papers, called "mat coated," are made with a brush or roll coater or on some type of brushless coating machine.

Satin and glossy-finish papers may also be uncoated. Plain glassine is an uncoated paper with a high gloss achieved by beating and supercalendering. It has innumerable decorative and decorative-functional uses (see "Glassine," p. 53). Other stocks may be supercalendered and steam treated for various degrees of gloss.

Shiny and glossy coatings are produced in a number of different ways involving different processes:

1. Brush finish—The surface of the paper sheet is polished by brushes after coating.

2. Plate—The coated paper is finished smooth by cold rolls through pressure in a stack-calendering machine. For very high finish this paper is sometimes steam treated before the calendering operation.

3. Friction glaze—The surface of the paper sheet after coating is polished by heated rolls in a friction calender.

4. Mica—The coating of mica paper consists of ground mica crystals in a vehicle of casein, gum or glue sizing to give it a sparkling, glinting surface.

5. Flint—A coated paper is highly polished by rubbing across the sheet with flint stones. This process is slow, making the paper a little expensive, but the finished product is one of the most beautiful of the decorative papers available.

6. Waterproof—Coated paper can be top surfaced with waterproof materials such as casein or gums; or coated once with heavily sized color or color mixed with waterproof gums. Another type of waterproofing is done with pigmented pyroxylin lacquers, which produce an unmottled surface having an antique or high-gloss finish. Pyroxylin-coated papers are highly scuff resistant.

Tissue

Tissue is one of the chief categories of decorative papers, enjoying wide use in the inner and outer packaging of thousands of products. Tissues for printing are usually 18- to 20-lb. stocks, as compared with the lighter weights for unprinted tissue ranging down to 7 lbs. Plain tissues used for commercial packaging and wrapping are furnished in sizes 20 by 30 in. for No. 1 white in 7-lb. weights; and 24 by 36 in. for No. 2 white and Manila, in basic weights of 10 lb. per ream. The No. 2 plain is more protective than decorative.

Several grades or types of tissue (see "Tissue Paper," p. 64) are noted for their more specific uses:

Jeweler's or silver tissue is based on a commercially sulphur-free stock to prevent product discoloration. It comes in two base stocks—white and kraft. The white is used by jewelers,

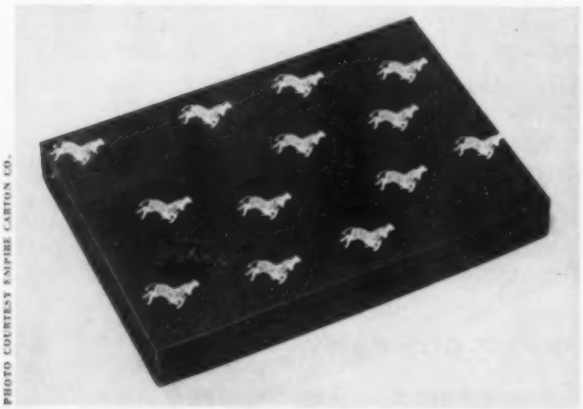
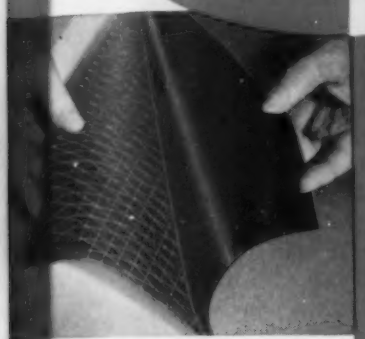


PHOTO COURTESY EMPIRE CARTON CO.

This paper wrap is hand screen printed white and red on a black background—in an exact reproduction of the design on the blouse that is contained in the box.

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Included in the standard Thilco line are Wax Coated Glassines; Wax Coated Krafts; Wax Impregnated Krafts; Wax Laminated Laminated M.F. or M.G. Krafts; Supercalendered Kraft; and Machine Creped. Excellent in strength, permanence and chemical resistant qualities.

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All types and grades for end-use conversion. Including No. 1 Bleached; Super-transparent; Light Amber and Special Opaqued Glassines; Bleached and Unbleached Laminating and Packer's Greaseproof; Plasticized; Wet Strength Treated. 20 lb. basis weight and heavier.









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For superior resistance to oil, water, acids and alkali

Polyethylene Laminated or Coated Kraft or Glassine; Special treatments include extruded polyethylene film applied to wet strength treated, Machine Creped and Mold-Resistant Kraft — Wet Strength Treated and Plasticized Glassine & Greaseproofs. Special non-staining Latex laminations.

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Special treatments include Machine Creping; Plasticizing; Dry Waxing; Water Finish; Wet Strength Treatment; Rust-Inhibiting; Flameproofing; Moldproofing; Machine Marking; Supercalendering; Coloring. For coating, laminating, bag making or other converting needs — Print decorated as desired.

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Made from most Thilco Papers

Self opening, Handle-Locking, Flat, Satchel or Pinch Bottom in Regular and Duplex styles — Standard and Special sizes. 25 to 120 lb. basis weights in Kraft; Duplex Glassine; Waxed, Asphalted or Wax Laminated; Wet Strength Treated; Plain or Decorated for product identity and sales appealing attraction.

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Standard or custom design wrappings, bags and box cover papers printed in up to 4 colors by Flexography (aniline) or 2 colors Rotogravure on glassine, greaseproof, M.F. or M.G. Kraft papers — plain, treated or embossed. Standard or Custom Embossing. Base papers 15 to 120 lbs. in wide range of 19 Standard Colors. Special color available for 7½ ton minimums.

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Thilmany will gladly furnish samples on any or all grades which you are interested in — and also assist you with any specific packaging problems you may have. Thilmany also maintains a complete art department for designing special imprints or custom designed Printed or Embossed decorated papers.

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THILCO *Functional Papers*



PHOTO COURTESY ALAN BERNI & ASSOCIATES, INC.

Custom-designed box wrapper combines modern look with old-fashioned feeling that carries forward traditional picture of a carriage associated with Fieldcrest's trademark for Trousseau luxury-line sheets.

gift shops and department stores. It contains a higher-grade pulp than regular No. 1 white tissue.

Kraft tissues will generally pass the nonsulphur test, too. However, tissue made from kraft stock has the same color as kraft wrapping paper, so that its use is reserved for hardware and machinery parts.

Fruit tissue is usually made from 12- to 18-lb. stock. It offers longer shelf life and enhances eye appeal of the fresh product. A little oil or preservative is sometimes added to citrus and apple wrapper stock so that the fruit will ship in perfect condition. Private-design wrappers are commonly used to identify brand-name fruits.

Florist tissue is the 12-lb. sheet of medium-grade No. 1 white tissue favored by retail florists for protecting delicate blooms. Waxed green tissue is also used as a wrapping liner.

Twist tissue is the grade used for wrapping wine, whisky and other liquor bottles. It is a kraft-base stock, which gives it good twisting strength. Usually it is printed with some special design or advertising copy and occasionally a watermarked tissue is used as a base stock. Twist tissue keeps bottles clean during shipment to the retailer and adds luxury appeal.

Hosiery tissue. There is also a coated tissue on the market that takes exceptionally fine printing and has a feel and texture different from other types. This is used often as a wrapper for hosiery. Because of its satin finish and soft texture, it is suited for wrapping other lightweight textiles.

Special effects

Metallic paper is produced in several different ways:

1. *Casein metallics.* Bronze, aluminum and copper for gold, silver and copper effects are ground into a casein or other gum vehicle and coated on the stock sheet. Stack calendering gives a smooth brilliant finish.

2. *Pyroxylin metallics.* The same metals are ground into pyroxylin lacquer and the paper is coated and stack calendered. A beautiful color range in several weights is available.

3. *Half-fine metallics.* Patches of thin copper or aluminum alloy approximately 5 in. square are laid on paper that has been pre-coated with an adhesive. The patches are overlapped to insure a continuous metallic surface. Many colors are available.

4. *Argentine.* A glaze of argentine (a precipitate of tin) is laid on paper and polished from a dull gray to a bright silver finish with a friction calender. This process can also be used for gold or colored metallics, in which case the gold or colored appearance is obtained by lacquering.

5. *Foils.* The foils are the most functional of the metallic papers. A continuous sheet of metallic foil is applied to a paper backing with a bonding adhesive.

Currently, aluminum has replaced practically all other metals in the manufacture of foil. A striking color line is available. Foil papers are usually more brilliant than other metallics and are used widely in the decorative-functional range—for the packaging of many perishable foods, tobacco products and novelty items, as well as for labels, seals.

Iridescent or pearlescent coatings are obtained in a wide range of shades by the use of pyroxylin lacquers. This particular pyroxylin-treated line is made by a process in which a crystallizing material is dissolved in nitrocellulose vehicle and applied to the surface of the web. The lacquered sheet is then dried and passed through a solvent bath to remove the crystallizing materials without disturbing the lacquer film. In this way, the crystal impressions are left on the surface in mother-of-pearl design. The sheet can be cleaned with a damp cloth.

Cast-coated paper is made by applying a special coating in an aqueous state to a sheet of paper. The coating is then brought into contact with a highly polished chromium-plated steel drum. The finish of the paper is the result of friction against the drum. A patent-leather effect can be produced on a strong, water-resistant paper.

Intaglio or rotogravure papers are printed from a copper roller engraved by the photogravure process or by the use of a pattern mill. The ink—which may be water color, oil or lacquer—is flowed into the engraved depressions on the roller. Excess ink is wiped off with a doctor blade.

Embossed and debossed papers, having a pattern in relief, are produced in various ways:

1. *Regular.* An embossing machine with a steel-engraved roll and a paper impression roll running in register with it presses the design into the paper, which shows in relief on the back of the sheet.

2. *Friction embossed.* The pattern is pressed against a smooth, gearless roller. Friction is produced by the operation of cold and hot pattern rollers, the latter being cored for steam in contact with the pattern. The combination of pressure and friction causes a deepening of color in the area of the pattern.

3. *Print embossed.* Color is applied to the depth of the design by running an ink roll in contact with the raised portions of the steel embossing roll.

4. *Two-toned embossing.* Contact between heated steel embossing roll and unmated paper roll produces a slight discoloration to give a two-toned effect.

5. *Spanished.* Color is applied to the entire surface of the sheet and then scraped off with a dressed blade, which leaves varied tones of the coloring on the sheet, the shade depending on the depth of the embossing.

Flocks. The process of coating the surface of a paper or other material with special fibres is known as flocking. The process gives effects which are high in luxurious or unusual decorative appeal. The finish is available in a wide color range.

Flock has a great number of specific uses, although it rarely makes a good flexible outside wrap. One of its most important packaging applications is as covering and lining material for

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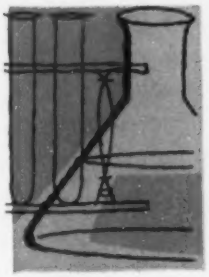


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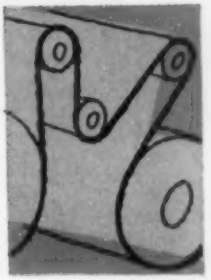
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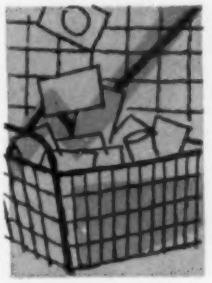
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Specially designed wrappers can dramatize products even when no copy appears. Here, subtle designs are used for set-up boxes packaging doctor's samples.

gift boxes or other special packages like silver chests and instrument or camera cases. It comes in conservative dark tones, bright full colors, pastels, and in the new patented fluorescent colors. It is also sprayed in contrasting or complementary shades, giving a noticeable sheen and movement to the surface covered.

Simulations. Given the variety of colors, textures and weights possible in decorative papers, it is not surprising that they are manufactured to stimulate a tremendous number of natural and fabricated materials. The various types of coating and embossing are put into service to imitate textiles of all kinds—tapestry, chintz, flowered cretonne, watered silk, burlap and linen—that look and even feel like their models. Wood and wicker types in shiny and dull finishes, from white knotty pine to African oak are available in a number of weights for different uses. Leather grains imitate fine pin seal and whorl-marked ostrich, while reptile patterns are also common in a full variety of colors.

In the field of structural material simulated papers are produced in dozens of designs. Paper tiles and linoleums come in many sizes and styles. Stucco and pebbled effects are produced, together with every kind of marble finish. Paper has been made to imitate the real thing in box coverings and linings of fancy gift containers for lines like stationery, soft goods, cosmetics, jewelry, etc.



PHOTO COURTESY CHAMPION PAPER & FIBER CO.

Luxury setting for satin sheets and pillow cases is created by a box covered with high-gloss, jet-black paper, steel-die stamped in white.

Private designs

Apparently retailers and producers have been using tons of blank paper a year in their packaging activities without realizing that liners and wrapping materials can drive home the sales message where other advertising leaves off. Here the private design comes into its own. At a varying increase in cost, the liner or cover of a package can be made to sell product, brand, manufacturer or retailer when other devices cease to operate.

Department, chain and specialty stores are probably the largest bulk consumers of private-design papers. Many of them have built entire promotions around them and guard the exclusiveness of their designs as an irreplaceable asset. Manufacturers are also using private designs—those catering to industrial and consumer outlets.

Private designs frequently but not necessarily make use of the company name or product trademark. Sometimes, particularly in the design of gift papers, a merchandiser depends on his striking motif to make the association in the consumer's mind with his outlet.

When you consider a private design, higher cost alone suggests care in design, but given a sufficient volume to warrant the investment, any private-design program may be started on a partial basis, beginning perhaps with inside tissues and carrying through later to the outside box wrap. Recent efforts of the paper converters have brought these papers within reach of many new customers. Some users report that one-color printing on the tissue they use adds from 10 to 25% onto the cost of the stock. This sounds high until the low unit cost of the paper is taken into consideration. However, there is no doubt that where the volume of stock used is great, or a continuing long-term need for a wrapping paper is in prospect, private designs may be practical.

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Papers *for Packaging*

S. D. Warren Company manufactures a variety of papers for the processing of distinguished merchandising packages. The range of grade qualities encompasses papers for box coverings, for labels and wraps, for folding cartons, and for package inserts.

For Setup Boxes

Warren's LusterWrap
A coated-one-side white paper with a mirrorlike gloss.

Warren's LusterWrap, Ivory
A high-finish coated-one-side paper with a mellow ivory shade.

Warren's White Embossed
Available in Alligator and Skytogen patterns.

Warren's Foiltone
Bright Silver and Mat Silver surfaces.

Warren's Brilliant Gloss
A bright white coated-one-side paper manufactured in white and tints.

Warren's Boxcote
Made in English Finish and Super.

For Folding Cartons

Warren's LusterBoard
A mirrorlike white coated surface on an extra-strong semi-bleached sulphate base. (See the LusterBoard insert in this book.)
Manufactured in 14 pt., 16 pt., 18 pt. and 20 pt.
Also available on patent coated base in 22 pt., 24 pt., and 26 pt.

For Labels

Warren's Offset Enamel C1S
A superior printing surface for lithography or letterpress.

Warren's Overprint Label C1S
For superior varnishing results.

Warren's Sebago Label C1S
A staple for can labels and bottle labels.

Warren's Lightweight C1S
A very light weight white coated-one-side label paper.

For Package Inserts

Warren's Thintext
The foremost India Bible paper.
Manufactured in basis weights 25 x 38–20, 24 and 30 pound.

Warren's Bibliopake
A light weight English Finish, basis 25 x 38–30.

Warren's Silkote Offset
A paper that has the appearance of a wove offset paper but that has a pigmented surface which sharpens and brightens prints.

Warren's Printone
A letterpress paper with the texture and appearance of English Finish but with a pigmented surface that raises the quality of halftone reproduction.

Special Base Papers

S. D. Warren Company manufactures base papers for a variety of converting purposes. Each grade is designed especially for a specific requirement. The classifications are:

For lacquer coatings.
For vinyl film casting.
For water-solvent coatings.
For gumming.

Research Assistance

The Warren Research Laboratory has developed numerous classes of paper for common and uncommon needs, and can supply sound scientific assistance to converters and packagers who have special problems.

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[BETTER PAPER Warren's STANDARD BETTER PRINTING]
Printing Papers

Properties of packaging papers

	PROPERTIES	Glassine, Plain	Glassine, Lacquered	Glassine, Waxed	Glassine, Laminated	Greaseproof Paper
	GENERAL					
1.	Type of material	Supercalendered dense paper from highly refined special pulp	Resinous-coated glassine	Waxy coatings on glassine	Multiple-ply glassine, waxy laminant	Uncalendered, dense paper from hydrated pulp
2.	Forms available	Sheets, rolls	Sheets, rolls	Sheets, rolls	Sheets, rolls	Sheets. rolls
3.	Clarity	Transparent to opaque	Transparent to opaque	Transparent to opaque	Translucent to opaque	Translucent to opaque
4.	Thickness range, in.	0.00075 to 0.003	0.00075 to 0.003	0.00075 to 0.003	0.0015 and up	0.001 to 0.004
5.	Maximum width, in.[1]	90	52	70	80	160
6.	Basis weight, lb.[2]	14 to 60	23 to 45	23 to 65	40 and up	14 to 60
7.	Yield, sq. in./lb.	7,200 to 30,857	9,600 to 18,782	6,600 to 18,782	10,800 and less	7,200 to 30,857
	PHYSICAL TEST DATA					
8.	Tensile strength, lb./in. width	—[5]	—[5]	—[5]	—[5]	10 and up
9.	Elongation, %	—[5]	—[5]	—[5]	—[5]	—
10.	Bursting strength (Mullen), lb./sq. in.	50% or more of basis weight	50% or more of basis weight	50% or more of basis weight	50% or more of basis weight	50% or more of basis weight
11.	Tearing strength (Elmendorf), gm.	Better than 50% of basis weight	Better than 50% of basis weight	Better than 50% of basis weight	Better than 50% of basis weight	Better than 50% of basis weight
	CHEMICAL					
12.	Water-vapor permeability, gm./24 hr./100 sq. in. at 100° F., 90% R. H.	High	0.2 and up	0.2 and up	0.3 and up	High
13.	Resistance to flavors, odors, gases	Good	Very good	Very good	Very good	Fair
14.	Resistance to mild acids, alkalies	Good	Good	Good	Good	Good
15.	Resistance to greases and oils	Very good	Excellent	Very good	Excellent	Very good
	PERMANENCE					
16.	Resistance to heat (limiting temperature)	—[3]	150° F.	120° F.	120° F.	—[3]
17.	Resistance to cold (limiting temperature)	Depends upon use of plasticizer	Depends upon use of plasticizer	Depends upon use of plasticizer	Depends upon use of plasticizer	Depends upon use of plasticizer
18.	Resistance to sunlight	Good	Fair	Fair	Fair	Good
19.	Dimensional change at high R. H., %	High	Good	Good	High	High
20.	Aging characteristics[3]	Good	Good	Good	Good	Good
21.	Flammability	Burns readily	Burns readily	Burns readily	Burns readily	Burns readily
22.	Converting characteristics[4]	Excellent, but not heat sealable	Excellent	Excellent	Excellent, but not heat sealable	Excellent, but not heat sealable

[1] In many instances, maximum widths vary from producer to producer and standard widths may be less than those given here.
[2] Based on a ream of 500 sheets, 24 by 36 in., or 3,000 sq. ft.
[3] Properties of all papers are affected by loss in moisture content when stored in dry, warm atmosphere.
[4] A general index of printability, sealability by heat or adhesives, and performance on automatic machines.

A chart this size could not possibly show all varieties of papers, coatings and laminations. Those selected are typical and should be considered indicative of the many values obtainable for packaging uses. Unless otherwise stated, the properties are for basic, unmodified materials. For names of manufacturers and suppliers of papers consult the Buyers' Directory at back of this book. The advertisements in Section 3 are also an important source of information regarding special grades, applications and end-use properties. See also charts on foils and films in Section 4.

Kraft, Plain	Kraft, Laminated	Polyethylene-Coated Paper	Parchment, Vegetable	Waxed Paper	Wet-Strength Paper[7]	
Paper from sulphate pulp	Kraft paper with asphaltic laminant	Kraft paper with polyethylene coating	Acid-treated cellulose	Thin calendered paper with waxy coating	Paper with added resins	1.
Sheets, rolls	Sheets, rolls	Sheets, rolls	Sheets, rolls	Sheets, rolls	Sheets, rolls	2.
Opaque	Opaque	Opaque	Translucent to opaque	Transparent to opaque	Opaque	3.
0.002 to 0.009	0.004 to 0.018	0.002 to 0.020	0.0017 to 0.0065 (single)	0.004 to 0.008	0.0025 to 0.0080	4.
120	120	120	90	60	108	5.
20 to 100	75 to 180	Nearly any weight can be obtained	18 to 110	22 to 100	40 to 80	6.
4,320 to 21,600	2,880 to 5,760	—[6]	3,927 to 24,000	4,000 to 20,000	5,400 to 10,800	7.
MD, 60-80; CD, 30-40 (% b.w.)	20 to 80	To 10% increase over base kraft	High wet strength	10 and up	Dry : 40% of b. w. wet: 20-50% of dry test	8.
2 to 5% (combined direction)	2 to 5%	2 to 5%	MD, 2 to 4% CD, 4 to 15%	2 to 5%	2 to 5%	9.
70% or more of basis weight	55 to 95% of basis weight	To 10% increase over base kraft	13 to 65 dry; good values wet	50% or more of basis weight	Dry : 85% of b. w. wet: 40% of dry test	10.
2-2.5 gm./lb. of basis weight	140 to 400	To 20% increase over base kraft	Sulphites, 60-80% of b.w. Sulphates, 100-130% of b.w.	1.5 gm./lb. of basis weight	2 gm./lb. of basis weight	11.
High	1 to 2	0.3 to 3.0	High if not specially treated	0.3 or more	High	12.
Poor	Poor	Fair	Good	Poor	Poor	13.
Poor	Poor	Excellent	Good	Good	Fair to poor	14.
Poor	Poor	Fair	Fair to excellent	Poor	Poor	15.
300° F.	150° F.	200° F.	200° F. when dry; any temperature, wet	100° to 120° F.	250° F. when dry; any temperature, wet	16.
Very low limiting temperature	Fair	—65° F.	Dependent upon use of plasticizer	0° F.	Good	17.
Fair	Good	Good	Good	Good	Good	18.
Approximately 0.05%	Considerable	Curls	Amount of change depends on type	Good	Much less than ordinary paper	19.
Good	Good	Good	Good	Good	Good	20.
Burns readily	Burns readily	Burns readily	Burns readily	Burns readily	Burns readily	21.
Excellent, but not heat sealable	Excellent, not heat sealable	Excellent	Excellent; some coated types heat sealable	Excellent	Excellent, but not heat sealable	22.

[6] Influenced by basis weight and end-use requirements.
[7] Yield depends on paper and weight of coating.
[8] Plain kraft, glassine or greaseproof paper can be given wet-strength characteristics by adding suitable resins to the pulp.

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double-barreled protection with

PAPERGLAS

The hallmark of high-grade Glassine and Greaseproof since 1916.

Westfield River Paper Company produces a grade for every use: Bleached PAPERGLAS • Opaque PAPERGLAS • Amber PAPERGLAS • GREASEPROOFS • WESTPAK (Wet Strength) • WESTQUIK (Release Treated) • SPECIALTIES.

Laminating, Embossing, Waxing

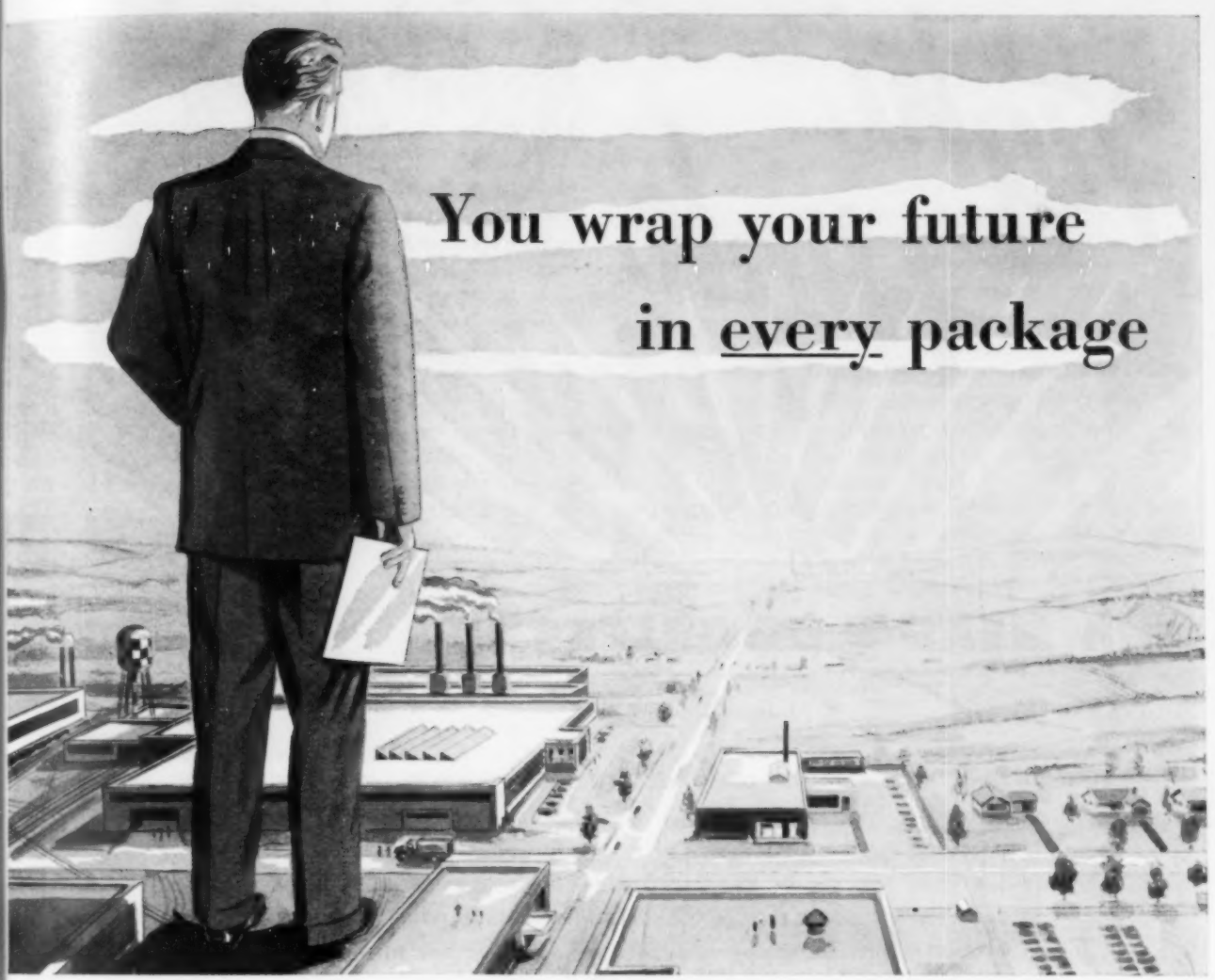
PAPERGLAS preserves quality, flavor, insuring correct moisture balance and cleanliness of product within the wrapping.

PAPERGLAS prevents objectionable odors, insects, dirt and other matter from penetrating food products.

This double protection for products . . . PAPERGLAS . . . is insurance at a minimum cost.

WESTFIELD RIVER PAPER COMPANY, INC., RUSSELL, MASS.

MILLS AT RUSSELL, MASS., LEE, MASS., WEST CONSHOHOCKEN, PA. AND 16570 LAS CASAS PLACE, PACIFIC PALISADES, CALIF.
NEW YORK CITY SALES OFFICE: 405 LEXINGTON AVENUE.



Make it brighter with KVP wrappers

Two food selling fundamentals everyone knows—yet sometimes forgets—are: *Goodness must be protected from plant to household table. For greatest package sales appeal show foods so realistically they look "good enough to eat."*

For *protection,* KVP makes Kalapak (for frozen foods), Super Kalakote, and the amazing new Kalafoil—all with unrivalled sealing qualities and surface brilliance—plus many specialized and laminated papers.

For *sales appeal,* KVP's large experienced art staff is at your service—and new 6-color letterpress and 8-color gravure equipment reproduces food illustrations with striking appetite-provoking realism. KVP wrappers usually protect food better—often lower packaging costs—often increase sales. Write for samples and full details.

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Specialists in FOOD PAPERS **KVP** For Protection and Sales Appeal

Fight High Humidity



with MEAD'S ODORLESS NEW HH MEAD HIGH HUMIDITY BOARD

To fortify fiberboard containers against destructive wilt caused by high humidity, Mead Research has created highly efficient new HH Corrugating Medium. HH is endowed with much higher rigidity than you get in standard board, and holds a high percentage of that rigidity even in 90 per cent relative humidity. Sturdy new HH medium at the same time retains the many qualities Mead always has processed into its famous Chestnut corrugating medium. With refrigerated commodities steadily increasing in importance, Mead HH Board is a most practical contribution to the container maker, the shipper and his customer, and to the consumer who tolerates no odor in his food and other purchases. So whoever you are, ask us for more information about this entirely different HH Corrugating Medium. It's new! It's revolutionary! It's economical! It's for you!



HH MEAD HIGH HUMIDITY BOARD

1. **RESISTS HIGH HUMIDITY;** *excellent for fruits, vegetables, meats, other foods*
2. **EXTRA RIGIDITY** *of HH Board puts higher top-to-bottom and end-to-end compression into containers*
3. **IT'S ODORLESS!** *Free of substances that impair contents. It's non-toxic*
4. **COSTS LESS** *and in many cases can replace double-wall board*
5. **PERFECT BOND.** *Fabricates as easily as any other board. Perfect runability*
6. **DISPOSABLE AS WASTE.** *No foreign substance to contaminate or render waste unusable.*

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LYNCHBURG 2, VIRGINIA.....River Road

Polyethylene-coated paper*

The most important plastic-coated paper in the packaging field today is polyethylene-coated paper. Polyethylene has a relatively low area cost, it has very good water, water-vapor and chemical resistance; low-temperature flexibility, and is heat sealable. It is very flexible from—75 up to 200 deg. F. and ages well because of its inertness and the fact that it is an uncompounded, pure plastic. The result is high-speed production of polyethylene-coated paper up to 115 in. in width. Coating thicknesses from ½ mil to 10 mils with excellent adhesion to many types of paper in a wide range of basis weight are feasible.

With the properties of polyethylene in mind, the present commercial packaging applications for polyethylene-coated paper can be better understood. A large use has been developed for multiwall bags with a 1- to 2-mil coating on 50- to 60-lb. kraft as the inner ply of the bag. Water proof multiwall bags have usually been made with an asphalt-laminated ply. These have poor low-temperature flexibility and stain upon contact with greasy materials. The polyethylene-coated ply provides comparable moisture resistance and good durability without these disadvantages. In addiion, a new use has been found for multiwall bags with the polyethylene-coated inner ply—for packaging solids which must not be contaminated by paper fibres. In this application the multiwall bags replace drums or separate plastic liners. They are also being used to package many bulk materials requiring moisture protection and cleanliness. These include ammonium nitrate, calcium chloride, peat moss, meat trimmings and plastic granules such as polyethylene.

To obtain the best protection in a bag against moisture loss or moisture pickup, it is desirable to use a heat-sealed bag. Polyethylene-coated kraft (1½ to 2 mils in thickness on 50 to 60-lb. sheets) has been fabricated into small, flat heat-sealed pouches or bags for packaging metal parts. A large volume of this coated paper has been sold to meet the requirements of the military waterproof bag specification JAN-P-117, Grade A, Class C. This paper has not only been used for military packaging, but by industry as well. The same type of heat-sealed bag, with less rigid specification requirements, has been used in considerable quantity by industry and by the Quartermaster Corps for unit packages of dry, powdered materials.

Heat sealing is commercially done on a standard automatic bar sealer at approximately 300 deg. F. to supply empty bags sealed on three sides. Other automatic heat-sealing equipment can be used for complete sealing and filling in one operation. On some machines, both flat and gusseted bags have been made with one side seam. The side seam may be made face to face and folded down flat with an adhesive to hold it in place or by sealing coated to uncoated side.

Rigid paper containers are now being made from polyethylene-coated and laminated paper. Many fibreboard drums have been made with a 1½- or a 5-mil coating on a white kraft board as the inner liner. These drums are used for packaging dry chemicals of many types, where moisture protection and cleanliness are important. Drums with a polyethylene lamination of a wet-strength board to a natural kraft paper as both the inner and outer liner are also being made for similar applications where moisture condensation is encountered. Spirally wound fibre tubes are now being made using a polyethylene lamination of greasproof paper to kraft paper, the greaseproof sheet serving as the inner liner of the tube. This liner paper meets the requirements of JAN-B-121, Grade A, Class 1, Amendment 2 ordnance wrap and the tubes are used to package metal parts. Thus an easily glued sheet is used to make a package that is both greaseproof and moistureproof. The carton and box field should also offer potential end uses for polyethylene-coated or laminated papers.

Polyethylene-coated paper is being successfully used as a wrapper for several types of products. It has become a popular locker paper for frozen foods because of its superiority to waxed papers in this application. Surface-waxed and wax-laminated sheets have been used as locker papers for many years but they do not give as good moisture protection as polyethylene after creasing and folding, particularly when handled at low temperatures. Polyethylene in contact with frozen meats and other frozen foods releases much better from the product in unwrapping. Usually a 40-lb. white paper with a ¾- to 1-mil coating is used.

A 1½- to 2-mil polyethylene coating on 40-to-60-lb. red kraft has been used in large quantities for the packaging of metal parts as a so-called "ordnance wrap" meeting the requirements of the military greaseproof barrier specification JAN-B-121, Grade A. In this use, a 2-mil coating on a machine-creped kraft has become popular because of the greater flexibility of the creped sheet. Polyethylene-coated paper is also being used as a moisture-resistant protective wrapper for high-grade specialty papers.

Another potential volume application is as a waterproof baling material meeting the requirements of the military waterproof barrier-material specification JAN-P-125. In this case a polyethylene coating is sandwiched between two sheets of kraft so that they can be easily creped in both directions and sealed with adhesives in the end use. Polyethylene-coated creped kraft is also serving as a waterproof case liner under the same specification. These papers replace asphalt-laminated or -impregnated varieties, because of their superior flexibility, inertness and nonstaining properties over a wide temperature range.

The combination of aluminum foil, paper and polyethylene is receiving considerable interest for the packaging of hygroscopic materials. Foil is a superb flexible moisture barrier and polyethylene enhances this value, particularly where the foil may develop pinholes from handling. The polyethylene can also, of course, be used as a heat-seal coating. These combinations include poly-paper-adhesive-foil and poly-foil-adhesive-paper. Heat-sealed bags made from the later type of formulation are used for packaging individual units of hygroscopic food products.

* Digest from an article by L. F. Swee, Technical Director, H. P. Smith Paper Co., Chicago, Ill.

PACKAGE COATING & LAMINATING QUIZ:

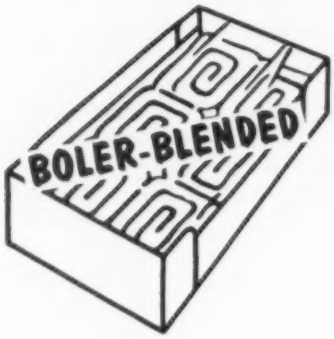
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A. When it's BOLER-BLENDED for your requirements.

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Parafflex COATINGS for fresher-keeping **Bread-Wrappers** . . . glossy, heat-sealing, printed glassine and other papers.



Parafflex COATINGS for more appealing **Meat & Bakery Trays & Boards** ...cleaner and greaseproof; for waterproofness also.



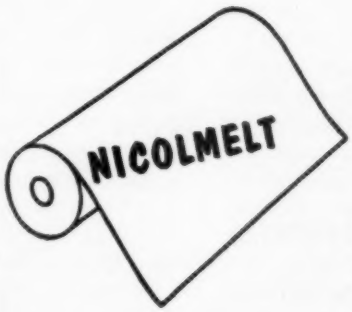
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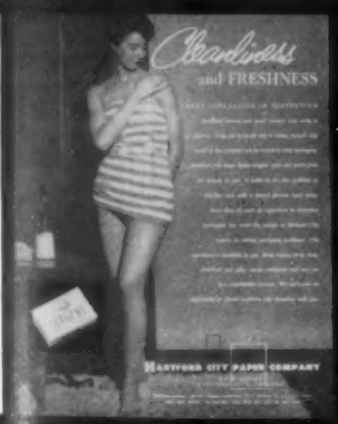
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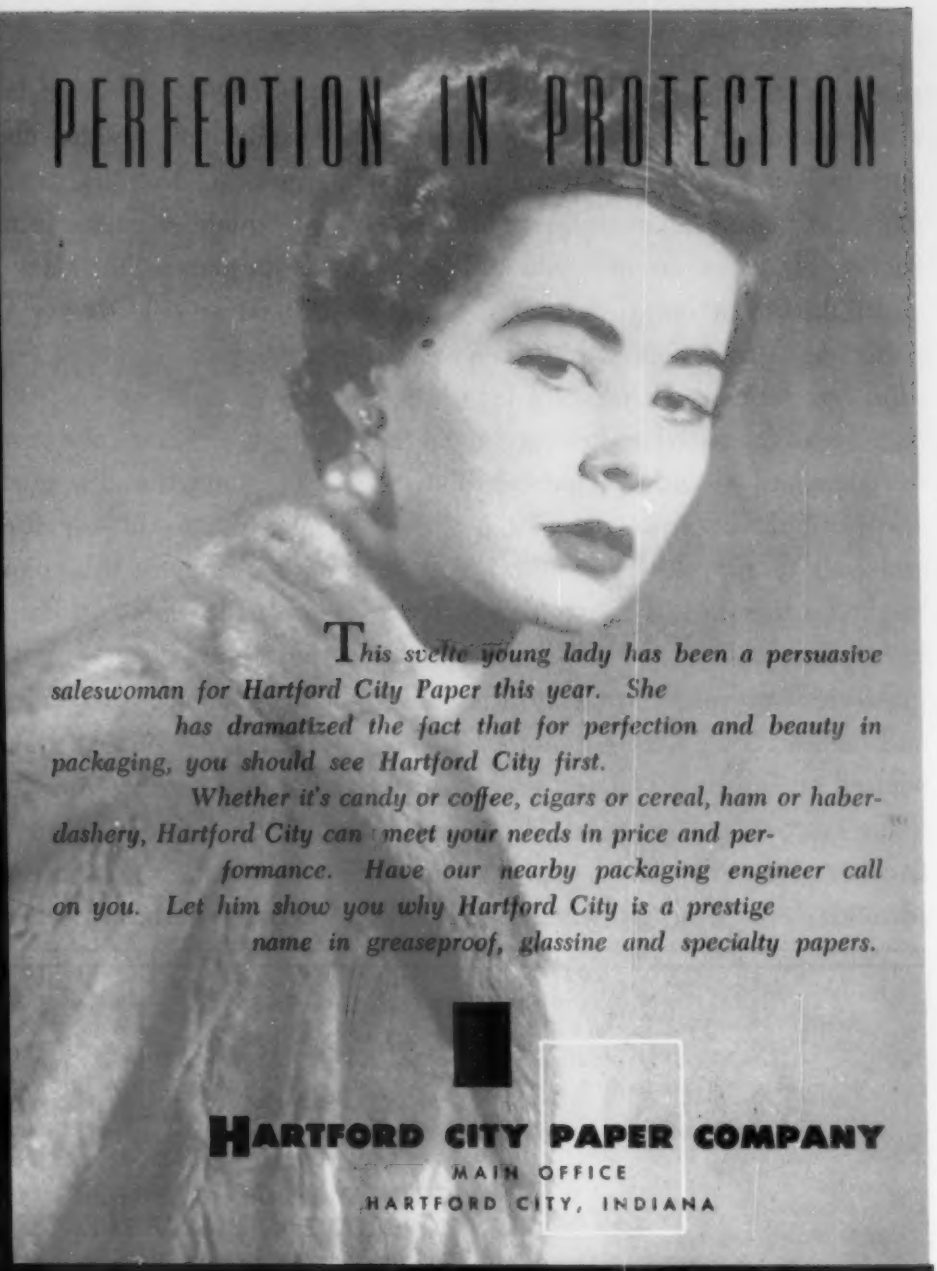
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PRODUCERS OF GREASEPROOF, GLASSINE AND SPECIALTY PAPERS

THE MATTHIAS PAPER CORPORATION 165 West Berk Street Philadelphia Pa.

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ASK MATTHIAS ABOUT BOX COVER

HAMMER BRANDS

HIGHEST QUALITY PROMPT SERVICE

GLASSINE GREASEPROOF

TRADE MARK REG. U.S. PAT. OFF.

WHITE—OPAQUE—COLORED 20-50 LB.

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TAILOR MADE FOR MODERN PROTECTIVE PACKAGING

IN MOST INSTANCES DO THE JOB BETTER THAN OTHER TYPES OF PAPER OR FILM

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HIGH GREASE—FAT—OIL RESISTANT
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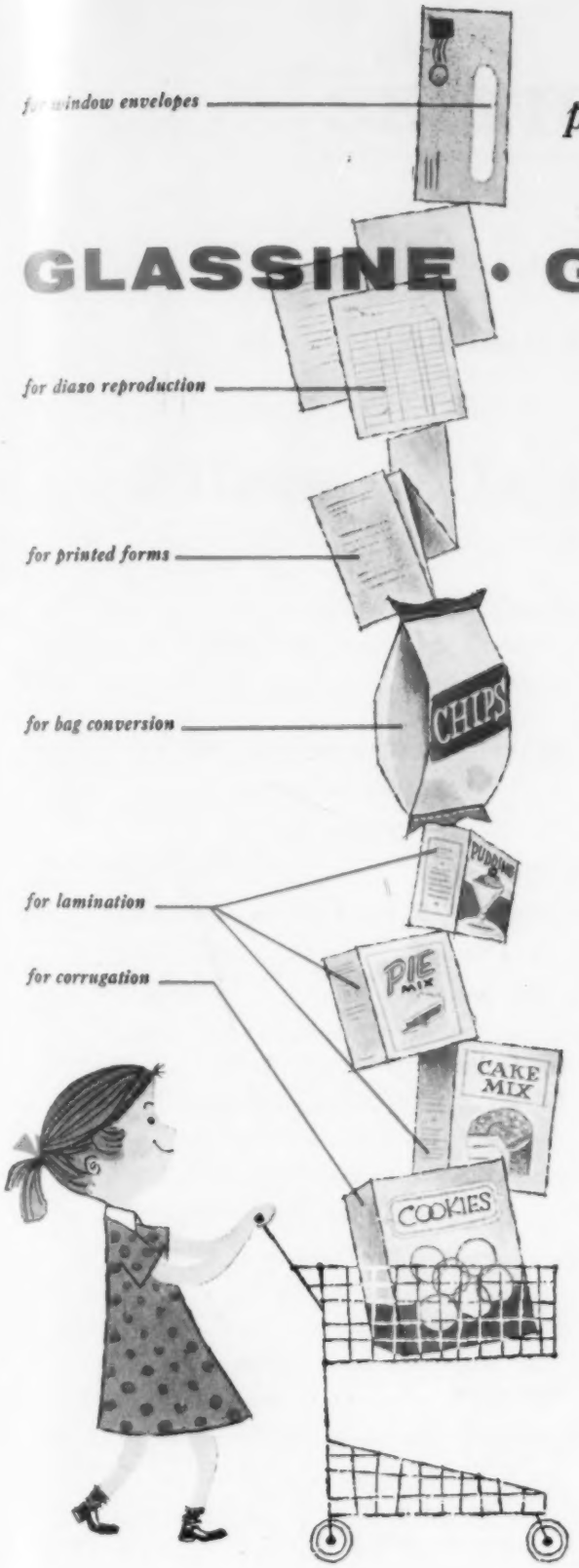
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PAPERMAKERS

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"79 Years of Service to the Food Industry"

paper unmatched for versatility...

GLASSINE • GREASEPROOF



No other paper made approaches Glassine and Greaseproof in protective qualities at such low cost. No packaging material can match them in versatility or usefulness. These dense, tightly formed papers will resist the penetration of grease, oil, fat or shortening. They will retain desired aromas and flavors, or exclude unwanted odors. Moreover, they can be made vapor-tight (by waxing,* laminating or coating) to keep moisture in or out. These Rhinelander papers also can be made transparent for jobs such as manifold forms, tracing paper, or window envelopes. Glassine and Greaseproof are used in literally hundreds of different ways because they are functional and economical.

Glassine and greaseproof papers are available in scores of different grades to perform the job you want, or, they can be tailor-made to fit your needs. When writing, please state your application.

Sample swatch books available on glassine, greaseproof and specialties. Write for your copies.

**Waxed grades are available through leading converters*

RHINELANDER PAPER

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Cellophane

by NELSON ALLEN*



PHOTO COURTEST AVISCO

Cellophane with controlled rate of moisture transmission is employed for tray-packed lettuce. Each package is, in effect, an individual showcase.

In 1924, the first American cellophane rolled off the casting machines in Buffalo, N. Y. The manufacture of this transparent film has since become a major industry. Today, total cellophane production in the U. S. is estimated to be around 350 million lbs. annually.

Cellophane was originally a regenerated cellulose film containing a softening agent. It lacked moistureproofness and heat-sealing properties. In 1927, moistureproof cellophane was developed and a few years later heat-sealing cellophanes appeared.

By combining better protection with visibility appeal, these improved films tapped vast new packaging markets. In turn, this helped give impetus to the great merchandising revolution known as "self service"—which is still expanding into almost every form of retail activity.

Approximately 75% of current cellophane production is devoted to packaging food, 13% to tobacco products and 9% to other packaging. Only 3% is for nonpackaging uses.

All types of cellophane have one common property—transparency. The film also is greaseproof and is produced in varying degrees of watervaporproofness. It is odorless and tasteless. According to type, it can be sealed with heat, adhesives and solvents. It takes printing beautifully. Gravure, flexographic and letterpress are the major processes employed.

Cellophane is used for almost every type of packaging—direct wraps, overwraps, bags, envelopes, window cartons, strip packaging, tear tapes, etc. One factor contributing to this wide usage is the low cost of the film. For example, in roll form the cost of 1,000 sq. in. of 300-gauge, moistureproof, heat-sealing cellophane is 2.87 cents. (See "Cost Table: Papers, Films, Foils," p. 105.)

Constantly expanding markets for cellophane have led to the development of many different types to meet specific product requirements. The film is now available in more than [illegible] classifications and about 150 grades. (See chart, page 95.) Roughly, cellophane falls into four categories: plain or nonmoistureproof, intermediate moistureproof, moistureproof non-heat-sealing and heat sealing.

Plain (or nonmoistureproof) cellophane is a nonporous film impervious to oils and greases. It also is a very hygroscopic film, the moisture content varying with the relative humidity to which it is exposed. In general, cellophane has a very low permeability to gases. But water-soluble gases will penetrate the film more readily if its moisture content increases.

This type cellophane is used in packaging applications where oil and grease resistance are desirable and protection from water vapor is unnecessary. Sealing can be done with adhesives or pressure-sensitive tapes.

Varying degrees of water-vapor impermeability may be obtained by applying special coatings to cellophane—which can also permit heat sealing. Most of these coatings have a nitrocellulose base as the film former. However, for cellophane used to package oily or greasy products, other synthetic resin coatings are recommended.

Nitrocellulose coatings may be adversely affected by contact with oil

PHOTO COURTEST DU PONT



Protection plus visibility are accentuated in the packaging of these peppermint sticks. Each stick is individually wrapped in cellophane and 30 sticks are packed in cellophane bag.

*Assistant Manager, Sales Development and Technical Service, Film Dept., E. I. du Pont de Nemours & Co. (Inc.), Wilmington, Del.

TYPES OF CELLOPHANE

Designation[2] Du Pont	Olin	Avisco	Characteristics	Principal uses
Plain or Nonmoistureproof Films				
300, 450, 600 PT	—	300, 450, 600 P-1	Nonmoistureproof, air and grease resistant; readily absorbs water; impermeable to dry gases; permeable to moist gases, depending on solubility of gas in water.	For general wrapping purposes where moisture protection is not needed; for packaging oily and greasy products.
300 PC	—	300 C-1	Nonmoistureproof colored film; various standard colors available.	For general wrapping purposes; ribbons, cord.
300 PJT	—	300 PV	Flame-resisting nonmoistureproof film; carries official Fire Underwriters' rating.	Decorative materials.
Intermediate-Moisture-Protection Films				
300 LST	—	300 DS	Partially moisture protctive; heat sealing; durability equivalent to 300 MST 52 and 300 MS-5.	For packaging products that require controlled rate of moisture loss, e.g., to prevent excessive drying yet protect against sogginess (sugared doughnuts).
300, 450 LSAT	300 LSAT	300, 450 DSB	Partially moisture protective; for use on wet or moist products; heat sealing.	For wrapping luncheon meats, certain fresh fruits and vegetables.
Moistureproof Non-Heat-Sealing Films				
300 MT 31	300 MT 31	300 M-1	Low rate of water-vapor transmission; sealed with lacquer-type adhesives or nitrocellulose solvents and low heat; greaseproof, oilproof; impermeable to dry gases; very low permeability to water-soluble gases.	For wrapping cigarettes, carton overwraps and cigar tubes. Where adhesive or solvent seals are desired and not a heat seal.
300 MAT 2	—	—	Standard moistureproofness, water resistant, durable at low temperatures.	Laminations, liners in frozen-food cartons.
Moistureproof Heat-Sealing Films				
300 MST 51	300 MST 51	300, 450, 600 MS-1	Standard moistureproofness; good durability and flexibility.	The 300 gauge for wrapping bread; twist wraps on small objects. Heavier gauges for overwraps and general uses.
300, 450 MST 52	300 MST 52	300 MS-5	Standard moistureproofness; average durability and flexibility.	Carton overwraps; direct wraps for greasy products, high-fat-content cakes.
300, 450 MST 53	300, 450 MST 53	300, 450, 600 MS-3	Standard moistureproofness; high flexibility and durability, particularly at low temperatures and low humidities.	Bags for extra durability and puncture-resisting wraps, bags for frozen foods (dry pack).
300, 450 MST 54	300, 450 MST 54	300, 450 MS-3	Standard moistureproofness. Better than average durability.	Laminations, carton overwraps.
300, 450 MSAT 80	300 MSAT 80	300, 450 MSBO	Moisture protective on wet products; one side wettable.	For wrapping fresh meats. Used to retard discoloration.
300, 450 MSAT 86	—	300, 450 MSB-3	Standard moistureproofness; strong heat seals; water resisting.	Direct wraps on wet products that require strong heat seal. Special laminations and carton liners.
300, 450 MSAT 87	—	300, 450 MSB-3	Standard moistureproofness; strong heat seals; water resisting; highly flexible and durable at low temperatures and low humidities (cold, dry climates).	Direct wraps or bags for frozen food, fruits, etc.; liners or overwraps for frozen-food cartons; bags for articles needing protection against water, oils, gases, etc.
450 K-202	300 OX-511		Excellent resistance to wrinkling and puckering, for smooth-appearing packages.	For packaging greasy, oily or high-fat-content products, dried fruits, fruit cakes.

[1] This tabulation represents only a partial list of types manufactured by each company. The corresponding types of cellophane cannot be considered exact equivalents, since processes and coating formulations vary according to manufacturer. However, characteristics and performances, as indicated, are largely similar. For fuller listings, consult a supplier (see Buyers' Directory, p. 679).

[2] See Table I—code designations—in this section. Du Pont and Olin use similar trade designations and code symbols. For gauge and yield, see Table II.

TABLE I–CODE DESIGNATIONS OF CELLOPHANE FILM SUPPLIERS

Type of film	*Designation*		
	Du Pont[1]	*Olin*[2]	*Avisco*[3]
Anchored or bonded coating for water resistance	A	A	B
Colored	C	–	C
Moistureproof coating, one side only	D	–	O
Partially resistant to blocking in humid atmospheres	H	–	–
Flame resistant	J	–	V
Less moistureproof than standard	L	L	D
Moistureproof	M	M	M
Plain (nonmoistureproof, non-heat sealing)	P	–	P
Rancidity retarding	R	–	–
Heat sealing	S	S	S
Transparent (uncolored)	T	T	–

[1] E. I. du Pont de Nemours & Co. (Inc.).
[2] Olin Cellophane Div., Ecusta Paper Corp., a subsidiary of Olin Industries, Inc.
[3] American Viscose Corp.

and greasy materials. The film's permeability to water vapor increases and its protective properties decrease. When this occurs, the cellophane may become wrinkled and puckered. To solve this problem, particularly on dried fruits, bakery products and candies, a plain type of cellophane coated with saran resin has been developed. A comparison of the performance of saran-coated cellophane with nitrocellulose-coated cellophane used to wrap fruit cake shows the difference.

During an eight-week storage test at 72 deg. F. and 17% R.H., fruit cake packaged in 450 MST-54 cellophane showed a 3.2% weight loss. Cake protected with saran-coated cellophane (450-K 202) lost only 0.7% of weight, and "hardness" and "taste" tests were equally favorable. Similar findings resulted when the tests were extended to 12 weeks.

When packaging foods requiring protection from moisture loss, care must be taken if cellophane with a very low permeability to water vapor is used. This may lead to sogginess, molding and sliming on doughnuts, pies, meats and fresh produce.

For example, in a study of the effect of humidity on mold, 50% of the tomatoes packaged in MST (low WVP film) showed mold after six days at 70 deg. F., 65% R.H. The average R.H. in the packages was 93%. Only 18% of the tomatoes packaged in LST (intermediate WVP cellophane) showed mold. The average R.H. in the LST packages was 72%.

Types of cellophane affording intermediate moisture protection are widely used for packaging produce, baked products and processed meats. Since many of these foods have a high moisture content, the coatings on the cellophane must be anchored (or bonded) to the film to resist the moisture action. Frozen foods, for example, have a high moisture content, requiring a cellophane combining a low rate of oxygen permeability with moistureproofness and good durability at low temperatures.

Moistureproof, heat-sealing types of cellophane are used to keep moisture both in and out of packages. Cellophane bags ordinarily are made from these types. However, for items with a very low moisture content, such as hard candy and some crackers and biscuits, the protection afforded by even the most moistureproof cellophane is often inadequate. In these cases, a double-wall bag is used.

Cellophane bags also have to withstand store handling and shipment under low-temperature conditions. Special low-temperature softeners can be added to give the film satisfactory durability. However, the softeners are not always good for carton or tray overwraps, since the films undergo more shrinkage when so treated.

Today, more and more food products are being packaged for self service in cellophane–even foods generally considered to be in the perishable category. An outstanding example of this is in the growth of self-service meats. In this field, where protection and visibility are primary requirements, transparent cellophane has been eminently successful. This success, of course, also has been due to the development of improved facilities for handling and displaying prepackaged meats at low temperatures.

The packaging of fresh meat in cellophane illustrates the many factors that must be taken into consideration when selecting the proper type of film. In addition to requiring a type of cellophane that is greaseproof and heat sealable, the film must have a low permeability to water vapor and a high permeability to oxygen. This



PHOTO COURTESY OLIN CELLOPHANE

It is easy to make up orders or take inventory when packages are bundled in cellophane. Today's demand for flexibility in distribution makes bundling in transparent cellophane both practical and economical.

TABLE II–APPROXIMATE YIELD AND THICKNESS FACTORS OF CELLOPHANE FILMS

	Plain types		*Moistureproof*	
Gauge[1]	*Sq. in. per lb.*	*Thickness, in.*	*Sq. in. per lb.*	*Thickness, in.*
300	21,500	.0009	19,500	.0010
300	–	–	21,000	.0009
450	15,000	.0013	14,000	.0014
600[2]	12,400	.0016	11,600	.0017
600[3]	11,700	.0016	11,200	.0017

[1] Gauge number was originally the approximate weight of one square meter of film in decigrams. The actual unit weights now vary somewhat from the gauge figure.
[2] Du Pont formulation.
[3] Avisco formulation.



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*Name upon request

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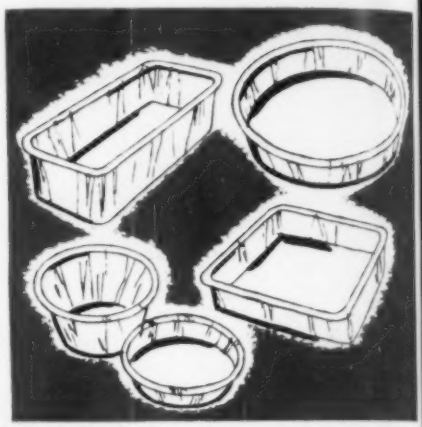
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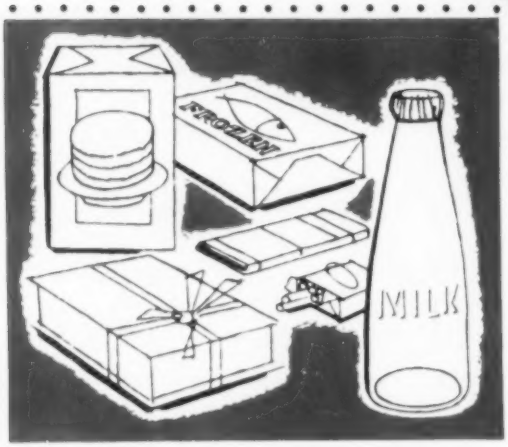
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Cochran FOIL COMPANY

LOUISVILLE 10, KENTUCKY

assures an adequate supply of oxygen to maintain the desirable red color (oxygenated myoglobin) associated with fresh meats. As shown below, dry cellophane has a very low permeability to oxygen. This permeability, however, increases rapidly above a certain level of moisture content.

OXYGEN PERMEABILITY
300 MSAT CELLOPHANE
AT R.H. RANGE—0 TO 100%

% R.H.	*Oxygen permeability, g./sq.M./24 hrs. STP*
100	39.8
93	4.3
81	1.2
66	0.53
35	0.50
0	0.04

Cellophane used to package fresh meats is coated on one side with a nitrocellulose-type coating, which has a low rate of permeability to water vapor and a very high rate of permeability to oxygen. The uncoated side (or wettable surface) is placed next to the meat. As a result, the moisture in the meat raises the moisture content of the cellophane to the level required to make the film sufficiently permeable to oxygen. (See the table below showing variations in weight loss and color retention for fresh meat packaged in various cellophanes.)

Cellophane is extensively used in vacuum and inert-gas packaging. But because of the insufficient durability of the film and because of heat-sealing problems, the cellophane is laminated to polyethylene and other films, or it is polyethylene coated. The coating provides the durability and strong heat seal, while the cellophane furnishes the gas barrier. Such laminations are used to package processed meats to prevent sliming, molding and fading of the color—solved by eliminating the oxygen.

Fading of the color of luncheon meats is caused by oxygen in the presence of light. Both must be present. Fading can be minimized by keeping the light at a low intensity. But in vacuum or inert-gas packages, the oxygen is absent and fading does not occur.

Cellophane also is being used extensively to package fruits and vegetables for self service. Fresh produce, however, has its own special packaging problems, since it takes in oxygen and gives off water, carbon dioxide and other materials during a respiratory process. This respiratory rate, which about doubles for each 10-deg.-C. rise in temperature, varies from very low on root vegetables to very high on such items as asparagus and leafy greens. Neither cellophane nor any other packaging film now on the market is sufficiently permeable to oxygen for all produce items under all conditions. For this reason, most cellophane produce packages should be ventilated to assure adequate oxygen.

Cellophane, in a wide range of colors, is widely and effectively used for gift and decorative packaging. Cellophane's printability allows the creation of beautiful designs and patterns. Where desired, flame-resistant softening agents can be incorporated in cellophane during the casting process to meet Fire Underwriters' ratings.

Cellophane's excellent machine-running properties have made it possible for packaging-machine manufacturers to develop a variety of automatic equipment during the past 30 years. Designed to handle cellophane in a wide range of simple and complex applications, machines are available for almost every packaging operation: automatic bag making and filling, bundling, bread wrappers, candy wrappers (bars, lollipops, caramels), cigar wrappers, cigarette overwrappers, carton and tray overwrappers, cracker and biscuit wrappers, heat sealers, milk-bottle hooding, textiles and window gluing.

COLOR* AND WEIGHT LOSS DATA ON PACKAGED FRESH BEEF

Wrap permeability			*18 hrs. at 40°F.*		*42 hrs. at 40°F.*		*69 hrs. at 40°F.*	
Water-vapor	*Oxygen*	*Outside % R.H.*	*Wt. loss*	*Color*	*Wt. loss*	*Color*	*Wt. loss*	*Color*
Low	High	60	0.6%	9	1.2%	9	2.0%	8
Low	Low	60	0.1%	4	0.2%	4	0.3%	4
High	Medium	60	3.3%	7	8.4%	6	14.8%	4
High	Medium	100	0.8%	8	1.3%	7	2.3%	5

* Color ratings: 10, perfect; 7, borderline; 6 and lower, unsatisfactory.

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Vitafilm a new GOODYEAR PACKAGING FILM

Plastic films

by C. A. SOUTHWICK, JR.*

Plastic films have helped open many new horizons in packaging during recent years and each year sees more films come into the market. Today there appears to be a new surge of developments in the field of plastic films and the packager is challenged, as he has never been challenged before, to study the new opportunities and to find in plastic-film developments many new protective and display potentials to help his product to new merchandising success.

Packaging films as a group represent a diversity of compositions, properties, appearances and end uses. Although, generally, they all possess considerable clarity, they range from complete transparency to a cloudy appearance. They represent the full scale of flexibility, from dead soft to comparative rigidity. End uses encompass the full cycle from decorative to purely industrial applications and the list is growing all the time. On two points, however, all plastic packaging films agree; they are made from synthetic resins or polymers or natural polymers and are formable or sealable by heat and pressures. (Cellophane, which is technically not a plastic film, is discussed on p. 94.)

One of the greatest single factors which has contributed to the growth of plastic packaging films is their ability to make heat-sealed packages. Another reason for the success of these films is their ability to be modified for special applications. And finally, they are generally of high durability, attractive appearance, possess many types of protective qualities and allow the merchandise to be seen.

This group of materials, in general, derives its origin and development from the synthetic resin section of the chemical industry. Since this industry is doing continuous and aggressive research, new resins are constantly making their appearance, existing materials are being improved and modified, costs are being reduced by means of improved methods of (1) making the base resins, (2) converting the films and (3) handling films in packaging.

The trend of plastic-film research and development seems to be falling into three principal categories:

1. The development of new and improved films by the blending of resins and the use of nonmigratory or resinous plasticizers. This field offers tremendous possibilities because of the large number of base materials available and the fact that blends or mixtures can be expected to produce unusual levels of properties or can be used to control any desirable characteristics or properties.

2. The production of thin films by means of heat and mechanical means directly from base resins without drying or use of solvent. At present, all polyethylene films are produced by extruding the molten resin and drawing it into thin sections. This method is so low in cost that film makers are trying to make more types of films by this process. Such heat- or extrusion-produced films will then be mechanically worked in much the same manner as alloy steels and the result will be new and unusual properties based upon the mechanical orientation of molecules. Heretofore, changes in properties of a film have been possible only by changing the molecule's chemical configuration.

3. The improvement of processes and equipment to imprint, form, seal and otherwise fabricate these films. No class of packaging materials will reach large tonnage until high-speed automatic machines are available to make printed and protective packages at a nominal conversion cost over the cost of the film. If such machinery is not available, the film remains a specialty item, used only in small volume.

The general techniques and know-how of handling one thermoplastic packaging film can usually be translated to any other plastic film with some modifications for the special requirements of each. This work on improved machinery for handling plastic films is most important, for the growth of these materials to date is only an index of their future.

In the following discussion, only the basic types of commerically produced plastic packaging films are described. For specific properties see, "Properties of Packaging Films" (p. 118).

Cellulose acetate

Because of its good dimensional stability, clarity and general durability, cellulose acetate laminated to paper or foil finds wide use for highly decorative and protective packages, labels, booklet covers and the like. In the thicker gauges cellulose acetate is very important in the construction of rigid transparent containers.

This material also is important in the packaging of fresh produce because of its insensitivity to softening by water and its high rate of water-vapor and gas transmission, an important factor for optimum protective packaging of perishables many of which spoil and become unattractive or unusable at an increased rate when circulation around the fruit or vegetable is limited. Cellulose acetate, because of its clarity, strength and machinability is used advantageously as a window material in folding cartons for toys, gifts, produce and the like.

Cellulose-acetate films differ radically from regenerated cellulose (cellophane) because the acetate base is water insensitive and can only be put in solution by certain solvents. Its manufacture is more involved and so it is higher in cost than regenerated cellulose. Because of the effect of some organic solvents on the film, it is not usually lacquered, although the film resulting from this treatment would have excellent moistureproof qualities.

(*This article continued on p. 105*)

* Technical Editor, MODERN PACKAGING ENCYCLOPEDIA.

PHOTO COURTESY DU PONT



Egg boiled in film bag dramatizes polyester film's strength, clarity and resistance to heat and water.



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Vinyl wrap for textiles combines strength, clarity and printability.

Techniques have been developed for heat sealing cellulose acetate. At one time this was difficult because of the narrow softening range, which necessitated a precise control of temperature, and the relatively high temperatures needed to effect the seal.

Cellulose acetate butyrate

In general, this cellulose compound resembles cellulose acetate in its behavior, general properties, solubility, etc. However, aceto-butyrate film is characterized by having greater durability, toughness and greater stability toward ultraviolet light and aging than acetate. It is particularly suitable for uses where requirements are for high durability and tenacity. Its price is somewhat higher than acetate, but in general is competitive.

Polyethylene

The inherent properties of polyethylene make it an excellent packaging medium. It has low levels of taste and odor, low water absorbency and a good level of moistureproofness. It is tough, durable and chemically inert. It has inherent flexibility (without the

FILM, DOW CHEMICAL CO.; PRINTED BY TEE-PAK, INC.



Saran film wrap for fudge gives longer freshness and flavor protection.

COST TABLE: PAPERS—FILMS—FOILS*

Material[1]	Cost per lb.	Yield, sq. in. per lb.	Cost per 1,000 sq. in.[6]
Glassine			
Bleached, 25 lb.[2]	$0.23	17,240	$0.013
Lacquer coated, moisture-proof, heat sealing, 28 lb.[2]	0.43	15,428	0.028
Laminated, bleached, 47 lb.[2]	0.28	9,191	0.031
Waxed paper			
Bread-wrapper grade, 39 lb.	0.22	11,080	0.020
Liner grade, moistureproof, amber, 31 lb.	0.22	13,935	0.016
Cellophane			
Moistureproof, heat sealing (300 MST)	0.56	19,500	0.029
(300 MST 51 or MS-1 type)	0.56	21,000	0.027
Moistureproof, water resistant (300 MSAT)	0.63	19,500	0.032
Cellulose acetate			
Cast (1 mil)	0.85	22,000	0.039
Extruded (1 mil)	0.71	22,000	0.032
"Mylar" polyester film (1 mil)[3]	2.50	20,000	0.125
Polyethylene (1.5 mil)	0.59	20,000	0.029
Pliofilm (1 mil)	1.10	24,000	0.046
Saran (1 mil)	0.95	16,300	0.058
Vinyl			
Cast (1 mil)	0.94	21,600	0.043
Extruded (1 mil)	0.94	21,500	0.044
Foil-acetate (1 mil[4]-1 mil)	1.30	6,490	0.201
Foil label stock (0.00035[4]-29 lb.)	0.42	9,195	0.046
Aluminum foil[5]			
Thickness, Inches			
0.00035	0.73	29,200	0.025
0.0005	0.69	20,500	0.034
0.0007	0.64	14,600	0.044
0.001	0.61	10,250	0.059

* This comparison of approximate costs is intended only as a guide. The figures given were obtained from 1955 price lists and are based on "volume" orders varying from 500 to 1,000 or more pounds, depending on the material involved. The reader must bear in mind that costs are influenced by many factors, including variations in grade, gauge, specific treatments, volume orders, market fluctuations, etc.

[1] Standard commercial grades, unprinted.

[2] Based on a ream of 500 sheets, 24 by 36 in., or 3,000 sq. ft.

[3] A thickness of only ½ mil is said to be a typical gauge for packaging applications. Cost of ½-mil Mylar is $3.00 per lb. Yield is 40,000 sq. in. per lb. and cost per 1,000 sq. in. is $0.075.

[4] Aluminum foil.

[5] Unsupported.

[6] For a guide to performance ratings see charts "Properties of Packaging Papers," p. 86, "Properties of Packaging Films," p. 118 and "Properties—Aluminum Foil and Laminations," p. 136.

BAG, TRAVER DIV. CONTAINER CORP. OF AMERICA



Polyethylene's strength and barrier properties are important for seeds.

addition of plasticizers) even at extremely low temperatures, which has led to its wide acceptance as a frozen-food packaging film.

Polyethylene film can be produced by any one of three processes: casting from a solvent solution, calendering or extrusion. By the extrusion method polyethylene film is available in thicknesses of 1 mil or greater and in constantly increasing widths.

In general, the film is characterized by extreme toughness and rubberiness and by excellent electrical properties. Films from different producers show transparency variations, but the film can be made with only slight haziness in the thin gauges. Within the past year, improved resins and processes have produced films with an excellent degree of transparency.

Polyethylene is available in extruded tubes, as well as sheets, in a large number of thicknesses and widths and is used extensively in this form as liner material for drums, etc. The normal commercial thickness of film produced for packaging applications is 1½ mil, but even in this thickness the yield—20,000 sq. in. per lb.—is comparable with the yield of several other films in a 1-mil gauge.

Most heat-sealing equipment that can be adjusted for temperature control within a narrow range can be used for polyethylene film. The resin has a sharp melting point and is apt to stick to the sealing surfaces and cause seal failure if the temperature is not carefully regulated.

Because of its chemical inertness, this film would not accept inks and for many years this was a serious limitation. However, processes and treatments have been developed to provide a strong anchorage of many types of inks and now all convertors are producing printed polyethylene that offers improved print quality, including greater resistance to scuff, stretch and general package wear. Polyethylene, as the result of recently developed methods of surface treatment, also can be sealed with aqueous adhesives. Research work in this field is continuing.

Polyethylene film is insensitive to water and many common solvents and chemicals; however, it is penetrated and softened by many types of fats and oils. Its resistance to the transmission of water vapor is good, but it readily transmits oxygen, solvent vapors and many aromatic materials.

Polyethylene film is finding ever increasing packaging applications because of its excellent physical and protective qualities as well as relatively low cost. Increased supply of the resin and improvements are responsible for the latter. As a result, polyethylene film is rapidly becoming one of the most economical packaging films in cost per unit of surface. (See "Cost Table—Selected Papers, Films, Foils," p. 105.)

Fields where the film is already well established include the packaging of fresh produce, textiles, hardware, small industrial parts, candy.

The film is also widely used in frozen-foods packaging where its low temperature durability and moisture protection make it ideal.

One of the most interesting developments in regard to polyethylene is the introduction of a new-method type of polyethylene known as low-pressure, or high-modulus or high-density polyethylene. This material, produced at a lower pressure and lower temperature than regular polyethylene, was just being introduced at the time this article was prepared. Barrier properties are said to be improved in a substantial degree in practically every category and the film has improved rigidity resulting in increased machinability. As with any new material, there are many questions to be answered, but the packager can be certain of one thing: he will be hearing more about high-density polyethylene in 1956 and he will be trying to find answers to some of the questions himself.



Polyethylene marshmallow bag co verts to hand puppet or stuffed to

Perhaps equally as challenging the above-mentioned development the potential offered by using po ethylene as a base for coatings. E perimental work along this line known to be in progress and results date indicate there may be significa opportunities for changing the fund mental properties of polyethyle films by means of surface coatings.

Polyethylene resin is important a coating material for paper, paper board and for various films. In ad tion, it is important as one of the pl in a range of laminated combinatio Polyethylene, for example, is co bined successfully with cellophan Two types are available: (1) po ethylene extrusion coated direct onto cellophane[1] and (2) independe webs of cellophane and polyethyle laminated with a bonding agent. Bo types are similar, but the differe converting methods make for vari tion in functional properties, handli characteristics and costs.

Rubber-hydrochloride film (Pliofilm)

Rubber-hydrochloride film was th first film that could be heat sealed t provide a true weld-type bond. Rub ber-hydrochloride film differs ma terially from the films previously de scribed because its base is rubber, natural raw material rather than synthetic resin. The process of manu facture consists of treating a crude rubber cement of special grade wit hydrogen chloride gas. The resulting resin is neutralized, dissolved in so vents and cast on a moving we

[1] See "Polyethylene-Coated Cellophane," MODERN PACKAGING, Mar., 1954, p. 203.


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Vinyl film shaped in a mold retains its fancy shape after it is attached to paper collar. This unique package molds ice cream and similar products into attractive prints.

which is passed through a heating chamber. The solvents are evaporated leaving a film that is transparent in thin, cloudy in heavier gauges.

Rubber-hydrochloride sheets are extremely tough and can be stretched 500 to 600% elongation. The stability of rubber films is affected by direct sunlight, but is unaffected by changes in relative humidity.

This film is available in some 12 basic types and 8 different grades. The various types are modified with plasticizers and stabilizers to produce three general categories of film: (1) films that excel in barrier properties for gas and water vapor; (2) films that are tough and flexible but give less barrier protection against water-vapor and gas transmission; (3) heavy-duty, special-purpose films.

Rubber-hydrochloride film can be printed, laminated to itself or to paper or other bases to improve physical or operating characteristics. Rubber-hydrochloride films are higher in price per pound than regenerated cellulose, but frequently by the use of light gauges with a high yield in square inches per pound, this inequality disappears.

Rubber-hydrochloride film can be plasticized by heating and then stretched under controlled conditions to give the film unusual characteristics. The stretching process greatly increases the toughness and strength in the direction of the stretch and permits the film to be shrunk around an object by applying moderate heat.

Vinylidene-chloride film (Saran, Cryovac)

Vinylidene-chloride film is produced by the extrusion process. It has some outstanding properties and some very significant limitations. It has the l
est water permeability of any of
packaging films. Its gas permeabi
is also very low, making it an ex
lent film for vacuum or gas packag
The film has high specific gravity
is one of the heaviest films. Its y
is relatively low and its base cost
cordingly is high. However, it has
ceptionally high tensile strength
together with its other properties,
permits the use of thin gauges. T
vinylidene-chloride film can offer
cellent protection on a per-do
basis, provided the packaging requ
ments call for special properties.

This film has the unusual prop
of tolerating temperatures up to
deg. F for short periods. Thus, co
meat products, such as picnic ha
use this property to good advant
the housewife cooks the meat in
wrap, which keeps flavor in. The f
can also be used with products to
autoclaved.

This film is very strong, to
highly flexible and completely tra
parent. It is flexible at low temp
tures and can be heat sealed.

Vinylidene-chloride films are s
able for cheese, nuts, candy, mar
mallows and other food packag
applications where odor, taste a
toxicity requirements must be m
and where extra sparkle and cla
are assets.

Vinylidene-chloride has excell
resistance to chemicals (it is wid
used as a cap liner for this reaso
especially for pharmaceuticals and
food containing edible oils). (S
Liners and Seals," p. 373.) The fi
has good resistance to sunlight and
cutoff of ultraviolet at approximat
3,000 angstroms may offer some p
tection against discoloration of me
caused by light rays.

Vinylidene-chloride film, despite
remarkable combination of properti
is not used in high volume in pac
aging. The major reason, apparent
is its inertness and static. Its cling
properties, so much admired by t
housewife, make it difficult to han
on conventional automatic machine
Also, special problems may be m
countered in heat sealing, althou
these are not insurmountable. C
tainly, the film's good qualities inv
serious attention to the problem
overcoming its handling difficulties
high-speed packaging equipment.

Vinylidene-chloride resins ha
been combined with certain other m
terials to make a highly oriented th

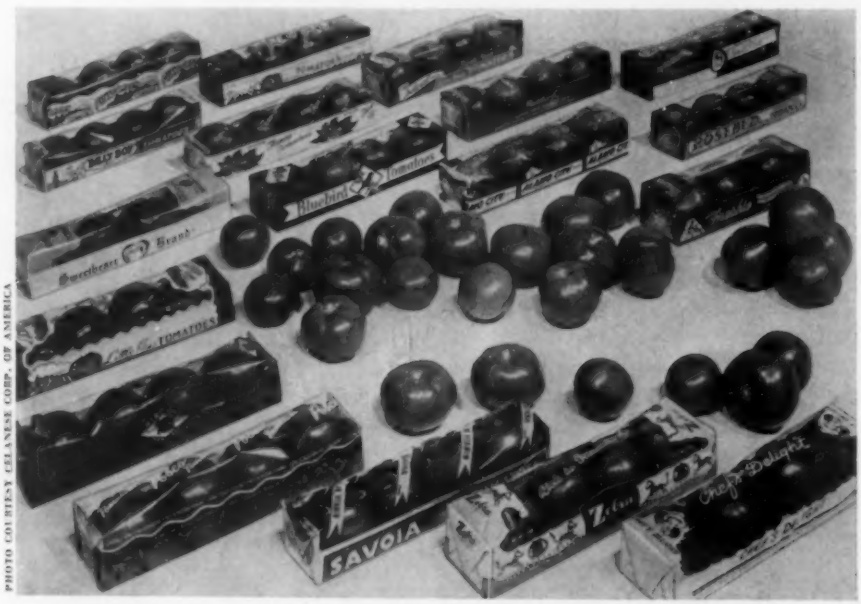


PHOTO COURTESY CELANESE CORP. OF AMERICA

Big-volume use for cellulose acetate film is in fresh-produce pre-packaging, where "breathing" properties of film give vegetables and fruit added shelf life.

This is the bedrock, basic information you should have . . .

about the most widely used PACKAGING and PROTECTIVE FILM

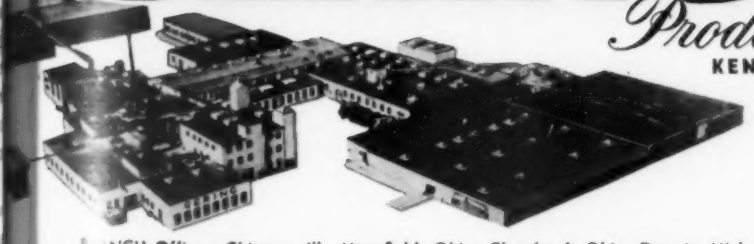
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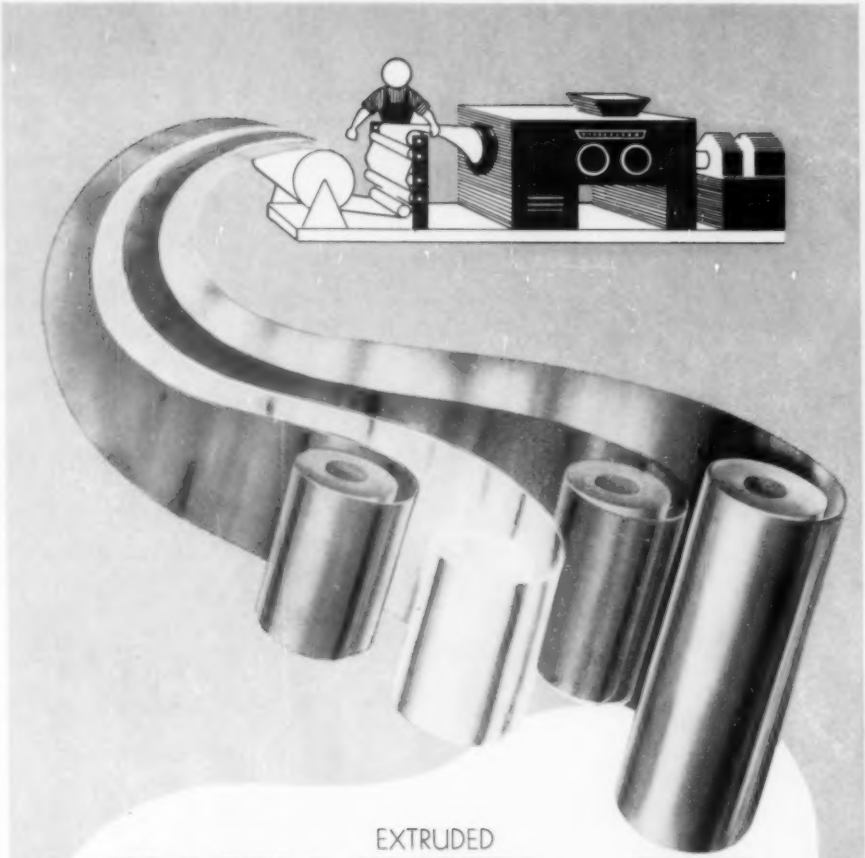


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Modern line for packaging poultry employs heat-sealed Pliofilm wrap

PHOTOS COURTESY GOODYEAR TIRE & RUBBER CO., INC.



Pliofilm's excellent puncture-resistant and stretch properties are advantageous in wrapping poultry.

film (Cryovac) which is particularly useful as a protective covering for irregular-shaped objects in frozen-food applications. The film is available in tubular form to be shrunk around an inserted product, poultry, picnic hams, etc., by the application of heat. This skintight method of packaging is known as the "Cryovac" process.

Vinyl films

The vinyl films may be composed of resins of vinyl chloride alone or blends of vinyl chloride, vinyl acetate and other resins and the films can be made by either of two widely different methods. Because of the large number of possible combinations of resin, plasticizer and other compo-

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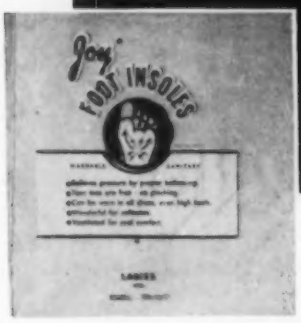
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PROPER APPLICATIONS . . PRODUCT IMPROVEMENT

nents, an extremely wide variety of films may be produced ranging from hard, brilliant films which approach cellulose acetate to the soft, flexible films similar to polyethylene. They may also be produced in a variety of colors and embossed finishes and are capable of being printed in multicolor. One method of making vinyl films uses the familiar procedure of casting a film from solvent solution or a dispersion of the resin followed by removal of the solvent or fusion. The other method consists of heating the resin so that it becomes plastic and producing a film by squeezing between hot rolls (calendering) or forcing through a flat or circular orifice under pressure (extrusion).

The solvent casting technique has the advantage of being able to make very thin films although improvements in the extrusion process are continually making rapid strides in this direction. Solvent casting can make films from a wider range of base resins and resin formulations, since it is not dependent upon the heat stability or heat-flow characteristics of materials. However, for many uses care must be taken to select the proper plasticizer-resin combination to meet toxicity, odor and taste requirements, or to prevent migration of plasticizer if the film is in contact with other resins, adhesives, finished surfaces, etc.

The vinyl films are characterized by their ability to make strong heat seals using a number of processes. Certain precautions, however, must be taken to prevent sticking to some types of heat sealers. Adhesive or solvent sealing is sometimes used.

In 1954 commercial application of a new extruded vinyl film was announced.[2] This film, first used as a textile wrapper, is important because it is based on a resin that apparently has sufficient thermal-stability and operating characteristics to run through extrusion film processes as well as similar coating processes.

This vinyl film is strong, prints well and is heat sealable. Currently it is not accepted for use in contact with food products.

Polyvinyl alcohol

Films of polyvinyl alcohol have been laboratory curiosities and are being produced only in limited quantities for specialized applications.

This transparent film is unusual in

[2] See "Vinyl Films for Textiles," Modern Packaging, Nov., 1954, p. 106.



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6. Hamburger
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8. Bacon
9. Chops
10. Steaks
11. Fresh Livers
12. Sweetbreads
13. Kidneys
14. Fish (Fresh & Smoked)
15. Poultry
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17. Cream Cheese

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17. Soft goods
18. Syrup
19. Shortening
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PHOTO COURTESY MILPRINT, INC.



Printed polyethylene bag for petticoats has a draw-string closure. Billowing garment is rolled up and placed in bag—solving problems for manufacturer and retailers.

that it is water soluble—as a matter of fact, it is made by casting a resin out of a water solution. The resulting film is exceptionally clear and brilliant and it has unusual strength properties in normal conditions of temperature and humidity. A hydrophilic (water soluble) material, it is impervious to oils and greases.

Polyvinyl alcohol films can be made in two types: one, soluble in cold water; the other, soluble in hot water. As yet, only a few packaging uses for this film have been announced.[3] There have been some industrial packaging applications, and several commercial packaging uses have advanced to experimental stages.

New types of film

The films previously described are those which represent the major film tonnage today. However, there are a few new films on the horizon which offer unusual properties.

One of these is a film produced from a polymer of ethylene glycol and terephthalic acid. Known as "Mylar,"[4] this film (see "Properties of Packaging Films," p. 118), is tough, durable and impermeable to a number of organic and inorganic gases. Mylar polyester film appears to have found one excellent field of application as a transparent window material in folding cartons. Mylar is relatively high in cost on a pound and yield basis, but not necessarily so on a cost-for-protection basis, since its functional properties are excellent and it can be used in under-1-mil gauges.[5] Mylar involves certain problems in machine handling, sealing and printing, and additional know-how for this film has yet to be learned. Because of its strength, Mylar has interesting potentials as a bag or wrap material that will resist wear and tear at the counter, increase shelf life, discourage pilferage and help eliminate damage and costly return of packaged goods.

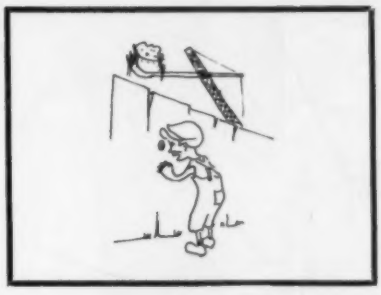
A listing of other new films includes: polystyrene, Kel-F, Parapol and nylon. All these films have great potentials, but it will take intensive evaluation to decide their ultimate commercial importance.

[3] See "Water-Soluble Package," MODERN PACKAGING, Jan., 1955, p. 79.

[4] Du Pont registered trade name.

[5] See "Polyester Film Is Here," MODERN PACKAGING, July, 1955, p. 98.





DISPATCHING **OR** **DISPLAYING**

Sending the bird on the wing is one way of assuring that your merchandise will arrive fresh and unspoiled. An easier way, and one that affords maximum protection, is the use of a good corrugated shipping container.

Growers Container Corporation manufactures such containers, sturdily made from the highest quality kraft board, and designed to protect ***even*** a bird on the wing.

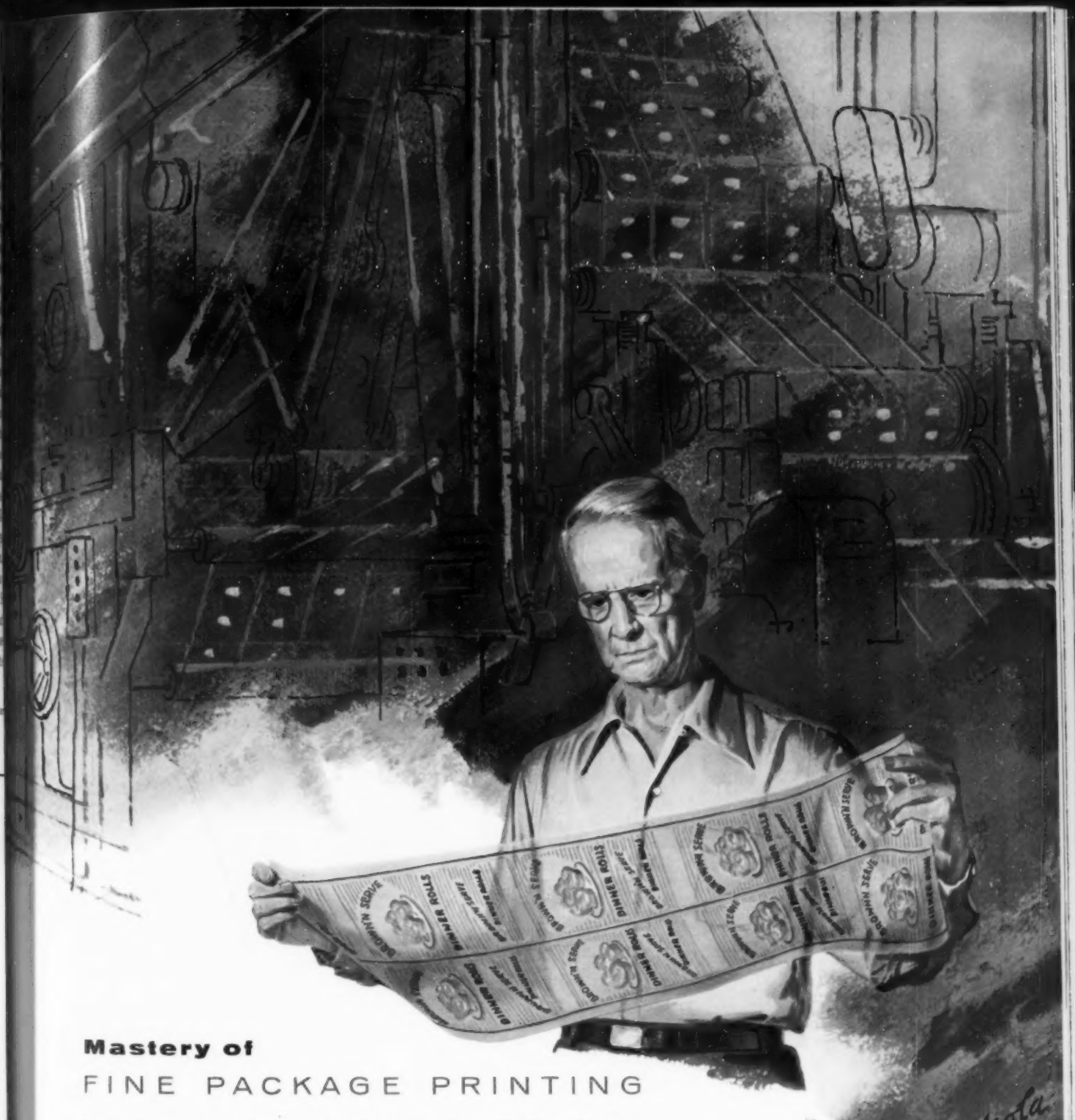
Why offer only a sidewalk superintendent's-eye view of your product? Packaged in transparent film, your merchandise is in full display . . . yet protected from bruising, handling, and the resulting loss from markdowns.

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How is this possible? Well, U.S. Packaging doesn't just fill your order—it creates it, from start to finish. That means plastic films are extruded, laminated to foil, paper, or other films, printed, slit, and shipped . . . all under one roof. It means, too, that your order is under the critical eye of USP engineers every foot of the way, that inexcusable delays are avoided allowing shipments to arrive when promised . . . as promised.

USP packaging materials are available in either pouches or roll stock, and include a wide range of paper, foil, plastic, and glassine laminations. Beautifully printed or plain, they are ideal for packaging pharmaceuticals, liquid or dry foods, vacuum packed meats, and a multitude of powdered or granular products.

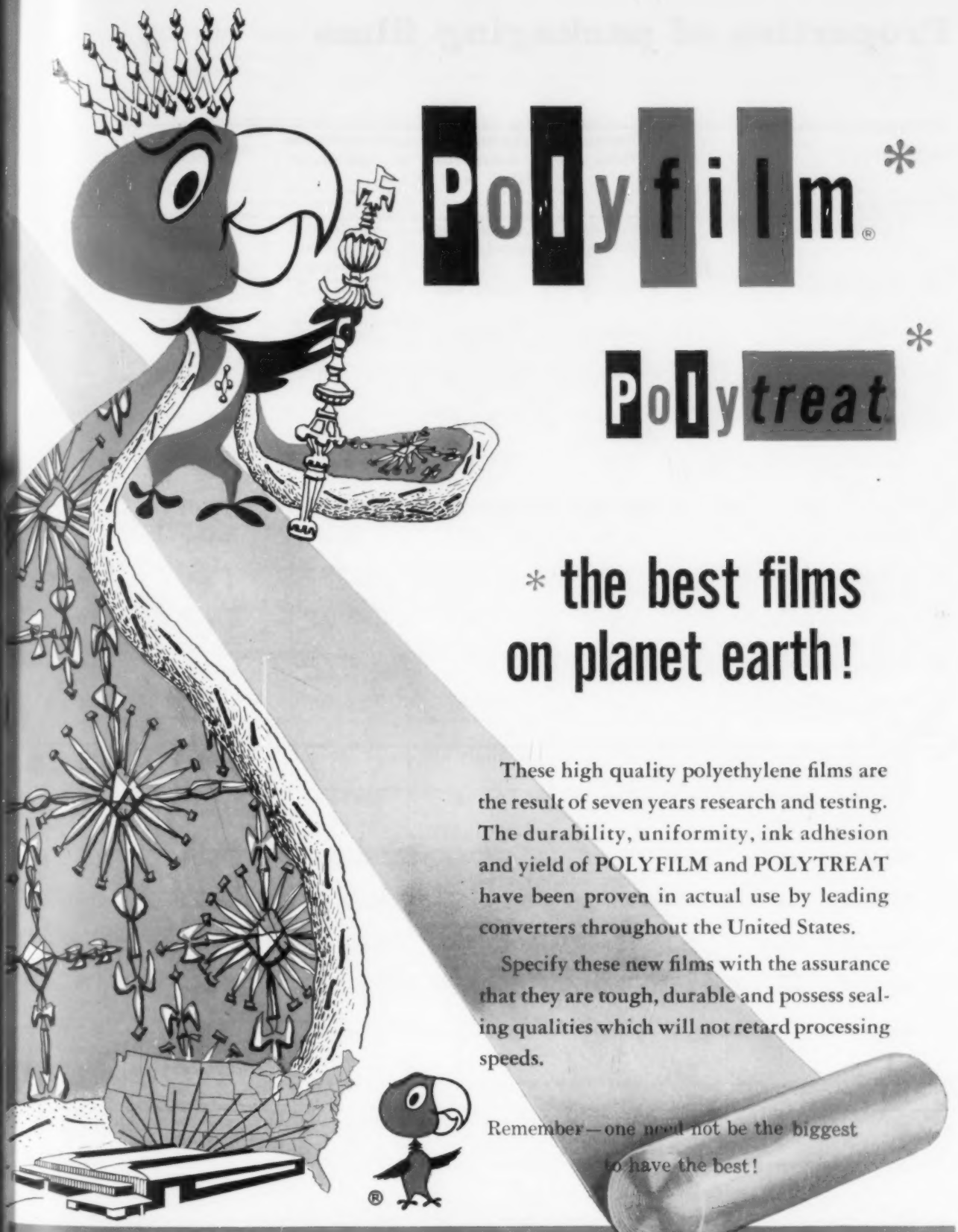
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Properties of packaging films*

PROPERTIES	Cellophane, Plain	Cellophane, Lacquered (MSAT or MSB)	Saran-Coated Cellophane	Cellulose Acetate[5]	Pliofilm[4] (Rubber base)
GENERAL					
1. Type of material	Regenerated cellulose	Lacquered regenerated cellulose	Saran-coated regenerated cellulose	Cellulose acetate	Rubber hydrochloride
2. Forms available	Sheets, rolls	Sheets, rolls	Sheets, rolls	Sheets, rolls	Continuous roll sheets
3. Clarity	Transparent or colored	Transparent or colored	Transparent	Transparent or colored	Transparent to opaque
4. Thickness, in.	0.0009-0.0016	0.0009-0.0017	0.001 to 0.0014	0.0005-0.002	0.0004-0.0025
5. Maximum width, in.	60	60	46	52	60
6. Yield[1]	21,500 (0.0009 in.)	19,500	19,500	22,000	24,000
7. Approximate specific gravity	1.45	1.40-1.55	1.44	1.25-1.35	1.11
MECHANICAL					
8. Tensile strength, lb./sq. in.	8,000-19,000	7,000-16,000	7,000-13,000	7,000-12,000	5,500-7,500
9. Elongation, %	15-25	15-25	25-50	15-50	Yield 10-20, ultimate 350-5
10. Bursting strength (Mullen), lb./sq. in.	–	–	–	50-85	Stretches
11. Tearing strength (Elmendorf), gm./mil.	2-10[3]	2-10[3]	7-15	2-15	60-1,600
12. Folding endurance	–	–	Over 15,000 (M. I. T.)	–	10,000-1,000,00 (M. I. T.)
13. Heat-sealing range, °F.	–	200-300	225-350	350-450[6]	250-350[6]
CHEMICAL					
14. Water absorption in 24-hr. immersion test, %	100	70-100	50	3-7	0.6-1.3 at 75% R. H.
15. Water-vapor permeability,[2] gm./24 hr./100 sq. in. at 100° F., 90% R. H.	Very high rate	0.2-1.0	0.5-0.9	100	0.5-1.5
16. Permeability to gases (oxygen, carbon dioxide)	Dry: very low[4] Moist: variable and higher[4]		Very low	Medium	Low to high
17. Resistance to acids	Poor to strong acids	Poor to strong acids	Poor to strong acids	Poor to strong acids	Good
18. Resistance to alkalies	Poor to strong alkalies	Poor to strong alkalies	Poor to strong alkalies	Poor to strong alkalies	Good
19. Resistance to greases and oils	Impermeable	Impermeable	Impermeable	Good	Excellent
20. Resistance to organic solvents	Insoluble	Insoluble	Insoluble	Soluble, except in hydrocarbons	Sol., cyclic hydrocarbons, chlorinated solvents
PERMANENCE					
21. Maximum use temperature	Begins to char at 375° F.	Begins to char at 300° F.	Begins to char at 375° F.	Approximately 300° F.	Softens at 200°
22. Minimum use temperature	Depends on type and R. H.	Depends on type and R. H.	About 0° F.	Brittle at subzero	Depends on plasticizer
23. Resistance to sunlight	No effect	No effect	No effect	Excellent	Fair
24. Dimensional change at high R. H., %	3-5	3-5	2-3	0.6% at 80% R. H.	None
25. Resistance to storage	Deterioration due to age is negligible if proper storage conditions are kept			Excellent	Good if kept in dark
26. Flammability	Same as newsprint			Slow burning	Self-extinguishing

*For materials more than 0.003 in. thick, see "Characteristics of Molded Plastics" and "Characteristics of Sheet Plastics" in Section 8.
[1] Value in sq. in. per lb. per mil (0.001 in.) of thickness, where not otherwise indicated.
[2] Using $CaCl_2$ in test dish. Values reported are based on 1 mil (0.001 in.) of film. Value for some films depends on type and amount of plasticizer.
[3] Figures represent pull to tear after starting. Force to start tear is too high to measure on some equipment and normally is not determined.
[4] Depends on moisture content of film and type and amount of plasticizer.

Basic types and accepted commercial standards are given here. However, many special grades are available. See also charts on papers (Section 3) and foils (Section 4). For names of manufacturers and suppliers of transparent films consult the Buyers' Directory at back of this book. The advertisements in Section 4 should also be studied.

Cryovac†	Polyethylene	Polyethylene-Cellophane[7]	Mylar† (Polyester Film)	Saran†	Vinyl Films Vinyl Chloride (Copolymers)	
GENERAL						
Saran resin blend	Polyethylene	Extrusion coated or laminated	Polymer of ethylene glycol & terephthalic acid	Polyvinylidene chloride	Vinyl resins	1.
Seamless tubes, bags	Rolls, sheets, flat or gusseted tubing	Sheets, rolls	Sheet, rolls	Seamless tubes, rolls	Rolls	2.
Transparent to opaque or colored	Transparent to translucent or colored	Transparent to translucent	Transparent to opaque	Transparent, translucent, opaque	Transparent	3.
0.0008-0.003	0.001 or more	0.002 or more	0.00025 & thicker	0.0005-0.002	0.001 or more	4.
Variable	240	60	50-55	40	72	5.
16,700	30,000	11,800 (2-mil-combination)	20,000	16,300	21,600	6.
1.64	0.92	1.2	1.38-1.39	1.68	1.23-1.29	7.
MECHANICAL						
9,000 to 12,000	1,350-2,500	5,000 and over	17,000 & higher	7,000-15,000	3,000-11,100	8.
75-120	50-600	15-25	70-130	20-40	5-250	9.
20-35	48	40-50	45 (1 mil)	35	25-40	10.
15-20	75-160	16-50	18	10-20	Varies widely	11.
Excellent	Very high	Good	Excellent	Over 500,000 (M. I. T.)	Good	12.
275-300°	230-300°[6]	230-300°[6]	490° F.[8]	280-300°[6]	200-350°[6]	13.
CHEMICAL						
Negligible	0.005 or less	—	Negligible	None	None to 5.5	14.
Less than 0.35	1.2	1.3	1.8	0.10-0.30	4-13	15.
Very low	High	Like cellophane	Very low	Very low	Medium	16.
Excellent	Excellent	Excellent	Excellent	Excellent, except H_2SO_4 and HNO_3	Good	17.
Good except ammonia	Excellent	Excellent	Excellent	Good except NH_4OH	Good	18.
Excellent	May swell slightly on long immersion	Like polyethylene	Excellent	Excellent	Good	19.
Good to excellent	Excellent, but may swell slightly on long immersion	Like polyethylene	Excellent	Excellent	Soluble in some	20.
PERMANENCE						
Softens at 270° F., melts at 290° F.	180° F. (softens at 230° F.)	180° F.	Melts about 490° F.	Softens at 290° F., melts at 310° F.	Softens at 200° F.	21.
Depends on plasticizer	−60° F.	Depends on cellophane	−80° F.	Good flexibility at 0° F.	Depends on plasticizer	22.
Good	Excellent	Excellent	Fair	Excellent	Fair	23.
None	None	3 to 5	None	None	None	24.
Good	Excellent	Good	Excellent	Excellent	Excellent	25.
Nonflammable	Slow burning	Slow burning	Slow burning	Self-extinguishing	Slow burning	26.

[5] Modified acetates—cellulose acetate butyrate (Kodapak II) and cellulose triacetate (Kodapak IV)—offer an additional range of properties.
[6] Unsupported film cannot be sealed on all types of heat sealers. Special sealing may be necessary to prevent adhesion to heated metal or to prevent undue distortion.
[7] Cellophane extrusion coated or laminated with 1-mil polyethylene. Test data assume polyethylene side toward products.
[8] Special sealing techniques required. Heat seals at 350° F., using benzyl alcohol.
† Visiflex manufactured by Goodyear; Cryovac by Dewey & Almy; Mylar by Du Pont; Saran by Dow.

your clear wrap problems stop at this page!



The packaging problem *was:* To create a long narrow tube... sparkling clear for maximum visibility ... heat sealable at both ends ... workable without waste in high speed, continuous production, packaging lines ... for a low priced-high volume item requiring long shelf life and outstanding display value.

The problem *was solved* by: Clopane vinyl film by Clopay. Clopane met every requirement of this packaging problem. Clopane is a polyvinyl chloride film that has been time and product tested for superior transparent film packaging.

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GCS Plus clarity with extra slip for bag specialties

GVC Exceptional clearness when transparency is worth the premium price

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Film Formers

by C. E. FAWKES*

The overwhelming percentage of all surface coatings is accomplished with about a dozen basic film formers —alone, modified, or in conjunction with each other. The accompanying table shows performance characteristics of nine of the most commonly used surface coating materials. Performance is roughly graded with respect to ten properties most frequently sought by package engineers in applying such coatings. The chart is intended only as a preliminary guide to relative ratings.

The practical evaluation of surface coating materials in packaging is a much more involved matter than would be indicated by reference to such oversimplified data as those contained in the chart. Numerous case examples could be cited to show that laboratory analysis is required if pertinent performance characteristics are to be evaluated and compared.

We are witnessing at this time a rapid decline in the use of several surface-coating materials which in the past have been important to packaging. This decline is the result of a continuing long-term increase in the unit cost of spirit varnishes, attributable to the rise in price of semifossil gums. Combined with this, there have been shortages and bad grading of these resins arising, perhaps, out of the political instability of the countries exporting them. It is probable that not over 5% of the total uses of spirit label varnishes have survived their increased cost, decreased quality and the competition of synthetic film formers. In contrast, the decreasing costs of synthetic varnish materials, combined with the steadiness, convenience and reliability of cellulose, vinyl and other domestic film formers, have made them the commercial favorites.

New color values. Perhaps the most spectacular recent development in coatings is the "stir in" pigments now available. These dry colors are unique in that the usual requirement of grinding or "inverting" from a water pulp is entirely eliminated. The pigments are immediately wettable by a variety of vehicles, and types are offered which disperse readily in solvent, emulsion or molten systems with no evidence of coagulation or conglomeration. They seem to offer the solution to many problem applications where the introduction of color has heretofore been slow, costly or impossible. In fact, a reconsideration of the potentialities of pigmented hot-melt coatings seems to be indicated.

Also quite spectacular has been the advent of so-called "optical bleach" coatings. Briefly, these coatings employ colorless fluorescent dyes and stabilizers. Ordinarily a glossy-varnish film applied to paper reduces the scattering of surface light, reducing the whiteness of the base stock. When lacquers and varnishes containing optical-bleach ingredients are applied to white paper surfaces, the usual dulling of whiteness is compensated for by the fluorescence of the colorless dye in the film.

* Pyroxylin Products, Inc., Chicago, Ill.

FILM FORMER PERFORMANCE OF PAPER LACQUERS USED IN PACKAGING

Rating system:
1 = Highly rated—top performance.
2 = Satisfactory or frequently used.
3 = Unsatisfactory in obtaining characteristic.
x = Conflicting data or data lacking.

Characteristic	*Cellulose Acetate*	*Chlorinated Rubber*	*Cyclized Rubber*	*Ethyl Cellulose*	*Nitro-cellulose*	*Oleoresinous (Alkyds)*	*Paraffin Wax*	*Wax plus Polyethylene*	*Vinyl Resins*
Abrasion resistance	x	2	1	1	2	2	3	x	2
Heat block resistance	1	2	3	3	1	2	3	2	x
Heat-seal response and strength	3	3	1	1	2	3	2	2	1
Water-vapor impedance	3	2	1	3	2	x	2	1	3
Sparness to liquid water[1]	x	1	1	3	2	2	1	1	1
Acid resistance (dilute)	x	1	2	3	x	x	x	1	2
Alkali resistance (Soaps, etc.)	x	1	x	1	x	3	1	1	x
Resistance to fats and oils	1	3	3	3	2	2	3	3	1
Color stability	1	3	3	2	3	2	x	x	1
Intrinsic glossiness per unit of film thickness	3	1	2	2	2	1	3	3	3

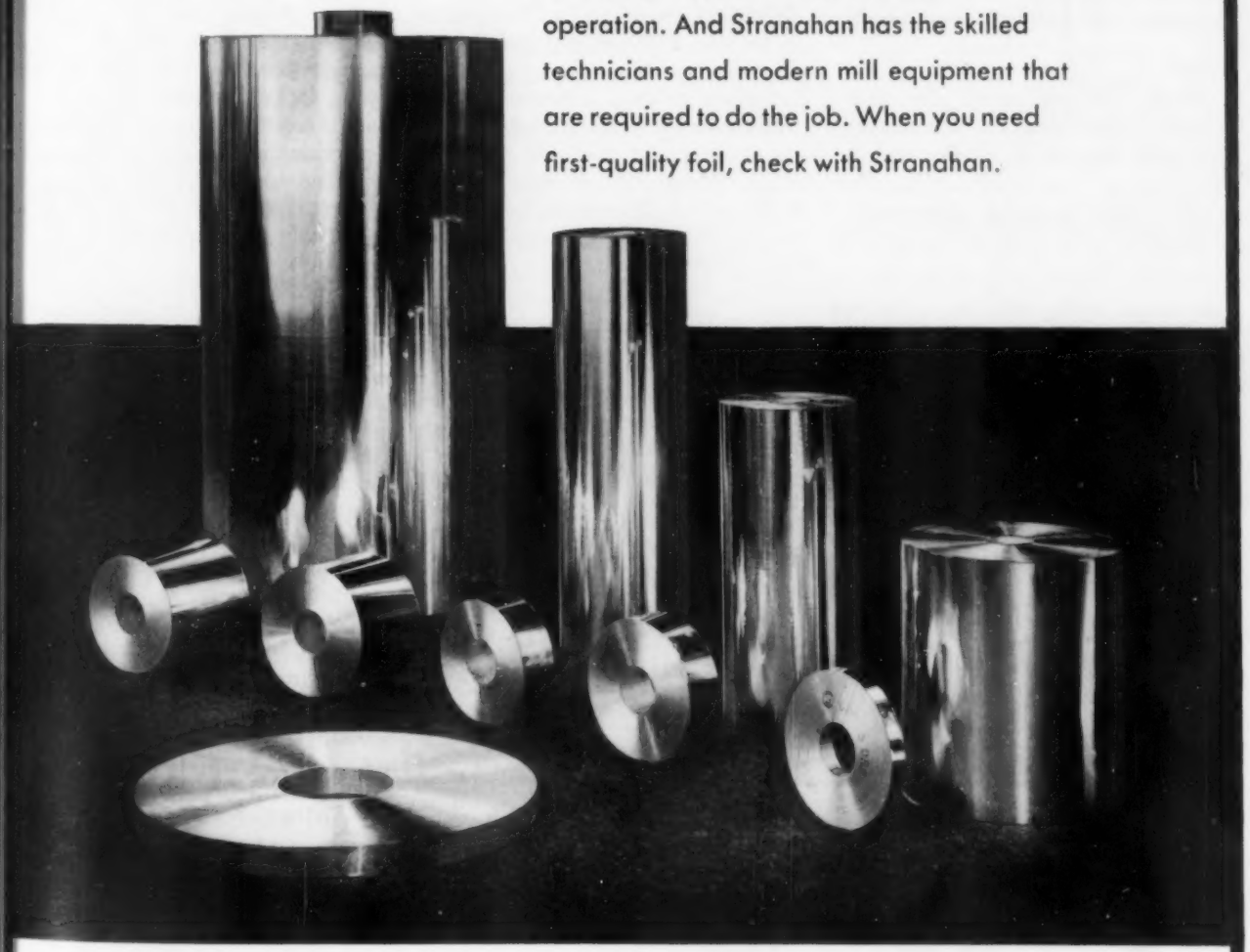
[1] Coating soaked in water will not chalk or turn white when it dries out.

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STRANAHAN FOIL COMPANY

Aluminum foil

by NICHOLAS A. COOKE*

The 1954 production of aluminum foil in the United States was 33% higher than that of the previous year. The fact that three-quarters of this foil was used in some form for packaging indicates that the packaging industry has placed its own economic evaluation upon foil. Today there is every indication foil will continue to be a strong and growing factor in packaging. The acceptability of foil can be attributed in large degree to its versatility, usefulness and attractiveness. The discussion here deals with the aspects of foil of most interest to packagers: types, physical and functional characteristics, principal end uses, convertibility, and trends.

Types

Alloys. For packaging, the most popularly used alloy has a minimum aluminum content of 99.45% and is identified in the industry as alloy 1145. A higher-strength aluminum alloy, designated as 3003, is used in the heavier gauges for the manufacture of semirigid food containers.

Thickness. Aluminum foils range in thickness from 0.00025 in. to 0.005 in. Thinner gauges are being made, but not for packaging purposes. Heavier gauges are in the sheet category. See "Table I—Typical Foil Thicknesses, Yields and Weights," p. 126).

Tempers. Foil comes from the rolling mill in a hard temper, having a light film of rolling oil on its surface. Since foil for most purposes must be soft, the hard foil is annealed by heating at high temperatures. This process makes the foil soft and pliable and removes its surface oils.

Surface finishes. Aluminum foil in thicknesses up to and including 0.001 in. is generally available with one shiny surface and one mat- or satin-finish surface. This results from rolling two layers of foil together. The shiny, outer, surfaces are polished from contact with the steel rolls; the mat surfaces result from being in contact with one another. Thicknesses heavier than 0.001 in. are shiny on both sides.

Surface conditions. Full hard foil has a very thin oil film on its surface. Dead soft foil is oil free and dry. For ease in machine wrapping, soft foil can be furnished in the lighter gauges with a slick, oily surface. In the heavier gauges, it can be coated with a semi-dry lubricant for wrapping and forming operations.

Forms. Foil is commonly used in continuous roll form for most converting and for many packaging operations. It can also be furnished in sheets, dead-soft foil usually being paper interleaved to facilitate cutting and for protection in shipping.

The latest military specification for uncoated aluminum foil, designated as MIL-A-148A, specifies Mullen bursting strength for dead-soft foil as shown in Table II (see p. 126).

Functional properties

A number of properties or qualities are responsible for aluminum foil's usefulness as a packaging material.

Appearance. One of foil's attributes is its appearance, which should be fully utilized whenever possible for point-of-purchase eye appeal. A wide latitude of decorative effects can be obtained by further embossing, glossy coating or laminating, and coloring or printing.

Hygienic aspect. Foil essentially is clean and gives the impression of cleanliness. Micro-organisms are destroyed during the annealing operation and foil offers nothing on which such colonies can thrive. When necessary, foil can be further sterilized.

Non-toxicity. Aluminum foil is entirely non-toxic and is used in direct contact with many types of foods.

Taste and odor. No taste or odor is imparted by aluminum foil even to the most sensitive foods, such as butter, cheese, oleomargarine, dehydrated foods, chocolate and gum. On the contrary, foil is used to protect such foods from absorbing undesirable tastes or odors.

Pliability. Soft foil has dead-fold characteristics and can be molded, crimped and formed very easily. The

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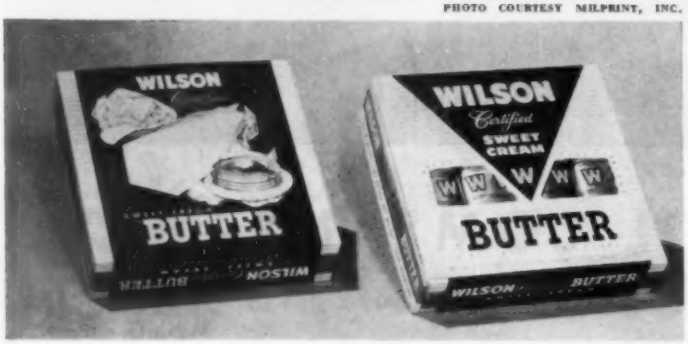
PHOTO COURTESY REYNOLDS METALS CO. AND THE DOBECKMUN CO.





PHOTO COURTESY ALUMINUM CORP. OF AMERICA

PHOTO COURTESY MILPRINT, INC.



Protective properties of foil as well as appearance have won an increasingly important place for this material for baked goods, confections and butter.

FOIL WRAP, REYNOLDS METAL CO.



Wrap of gold-colored aluminum-foil on bar soap may set pattern for whole soap field. Besides having eye appeal, foil can prolong shelf life by retaining moisture and preserving soap's aroma.

ability to form a deep seat and to seal well is used in the bottle-cap liner industry. Foil will remain flexible throughout a temperature range far surpassing that required in most packaging applications. Dead fold enables foil packages to be used for re-wrap purposes.

Water-vapor resistance. Aluminum foil does not have a true moisture permeability rate, because it is an impermeable metal. Whatever transmission does take place is through unavoidable microscopic breaks in the foil. This transmission will vary depending upon the number of such discontinuities. Foil 0.0015 in. and over is conceded to have zero permeability, but even in thicknesses as low as 0.00035 in. the transmission rate is negligible. When combined with other packaging materials, even the thinnest foil imparts to the combination an extremely low water-transmission rate. It is this property in foil that is used to prevent freezer burn in frozen foods and which prevents the drying out and shrinking of moisture-bearing products. It also protects dry products from spoilage by moisture from outside the package.

Nonabsorptivity. Foil is nonabsorptive to liquids of all types and will not shrink, swell or soften in contact with moist contents, whether these are hot or cold. This characteristic is useful in brown-and-serve packages.

Greaseproofness. Aluminum is completely greaseproof and oilproof and is used in the construction of packages needing this property. It will not stain during oven use or on prolonged contact with oils and fats of any descriptions.

Ultraviolet resistance. Light rays are harmful to many types of foods, such as nuts, chocolates, candy, potato chips, cookies, cheese tidbits, butter and bacon. They can cause oxidation, rancidity, loss of flavor, loss of vitamins, discoloration and staling. Aluminum foil will prevent such action very effectively.

Gas resistance. In heavier gauges foil will offer a complete barrier to oxygen and other harmful gases. Light gauges of foil will impart to paper and plastic films a low degree of gas permeability, reducing the tendency of the package contents to oxidize or rancidify. Foil will also prevent the loss of aroma from aromatic products.

Permanence. Aluminum foil is dimensionally stable and unaffected by sunlight. Being a metal, it has no volatile ingredients and will not dry out or shrink on aging. Flexibility on aging will also remain unaltered.

Contamination resistance. An effective barrier is provided by aluminum foil against contamination by dust, dirt, grease and air-borne organisms.

Heat conductivity. Foil will cool quickly and heat rapidly, making possible many packaging applications involving both freezing and baking.

Heat reflectivity. Up to 96% of radiant heat is reflected by aluminum foil, and as little as 4% is emitted. This makes foil desirable as a heat insulator for many types of packages in which product protection and the maintenance of high or low temperatures is desirable.

Chemical Properties. Wet contact between aluminum and most heavy metals and their salts should be avoided. There are exceptions, however, and some salts will act as inhibitors to corrosion. Certain strong acids will attack aluminum, as will caustic alkalies. Many mild acids are without effect.

Because of the many factors involved, no single rule describes the action of acids and salts on aluminum and tests should be made in cases of doubt. Chlorides, especially in acid solution, are severe in their attack and should not be in direct contact. Pickle brine is such a product. Cheese, which contains salt in an organic acid, is packaged very successfully through the use of thin protective coatings. The salt in frozen foods is also checked by such coatings. Use of thermoplastic coatings also imparts heat sealability to aluminum.

Seldom is only one property or quality utilized in package design. For example, the foil in a supposedly simple butter wrap serves several functional purposes—it is non-toxic, greaseproof, nonabsorptive to refrigerator moisture, prevents drying out of the butter, prevents shrinkage, bleaching and the pickup of strange tastes and odors. It retards rancidity and loss of flavor caused by the action of oxygen and light and protects against contamination by dirt, mold and bacteria.

The limitation of low tear strength of foil is easily overcome by combining foil with paper, etc.

Principal end uses

Plain unsupported foil is used for semirigid containers for bakery products, specialty foods and frozen cooked foods. Unsupported foils are also made into milk closures, florist wraps, hermetically sealed packets and metal-parts wraps, as well as tags, nameplates and sealing tapes. Other uses include wraps for yeast, hard candy, chocolate and cheese, also overwraps for frozen poultry and frozen-food trays.

For other applications, foil in combination with packaging materials, such as paper, plastic or cellulose film, and heat-seal coatings is used:

As direct wraps for chewing gum, candy bars, chocolate, tobacco, butter, cheese, oleomargarine, photographic film and others.

As carton overwraps for dried fruit, frozen foods of all descriptions, prunes, dates, figs, cookies, etc.

As case liners for lettuce, citrus fruits, celery and cauliflower.

As bags or sealed pouches for breakfast cereals, leavening agents, potato chips, nuts, coffee, cocoa, tea, dry soups, as well as a variety of drugs, chemicals and cosmetics.

Foil is combined with paperboard for brown-and-serve trays, cake boxes, fibre drums, box liners, tube and canister liners and ice-cream containers. Materials packed in such containers include oils, greases, refrigerated biscuits, self-rising flour and cake mixes, baked goods, chemicals and metal parts.

Foil body, neck and throat labels are employed extensively on glass bottles for packaging beer, wine, spirits, olives, condiments, etc.

Specialty decorative use of foil in-

TABLE I–TYPICAL FOIL THICKNESSES, YIELDS AND WEIGHTS

Thickness		Yield		Weight, lb./ream
Inches	*Millimeters*	*Sq. in./lb.*	*Sq. ft./lb.*	*24 x 36 (480)*
0.00025	0.00635	41,000	285	10.1
0.00035	0.00889	29,200	203	14.2
0.00050	0.01270	20,500	142	20.2
0.0010	0.02540	10,250	71.3	40.5
0.0015	0.03810	6,800	47.2	60.9
0.0020	0.05080	5,100	35.4	81.3

cludes tags, seals, nameplates, gift wraps, labels, shredded foil, gift boxes and embossed rigid boxes.

The field of military packaging is another area in which aluminum foil plays a major role.

Convertibility

Packagers and designers have two mainstays in foil: its varied protective qualities and its appearance. Foil will provide exceptional appearance plus the necessary product protection more economically than other materials and methods required to achieve the same result. In many instances only the thinnest gauge of foil need be used, suitably combined with other materials. Strength, toughness and handleability on high-speed equipment are obtained with paper and plastic or cellulose films by the process of laminating. Heat sealability, scuff resistance and additional chemical resistance are added by coating. Decorating is done in the form of printing, embossing and coloring.

Laminating. Practically any set of performance conditions can be met in a foil lamination by the proper selection of both companion web and adhesive. (See chart "Properties of Aluminum Foil Laminations," p. 136). Foil is adaptable to a range of laminating agents. Combination with porous papers is made with aqueous or molten adhesives, whereas lamination to dense papers or nonporous webs is made with pressure- or heat-sensitive adhesives, usually cements based on rubber or resins carried either in solvent or in emulsion. Waxes are sometimes also used.

Coating. Organic coatings, applied from hot melt, organosol or solution are used for heat sealability, scuff resistance and added chemical resistance. A variety of formulations is employed, embracing many properties and modifications. Such coatings are adaptable to the roller, gravure, knife or slot-extrusion process of application.

Decorating. Foil offers a complete range of decorating possibilities. As a starting point, there is a choice of either the bright, shiny surface or the satin, mat surface. Designers can utilize either for a clean, sanitary appearance. The proper combination of opaque and transparent inks on foil gives striking printing effects which are not obtainable with other media. This can be supplemented by embossing, in register if necessary, in practically any texture.

In applications where foil must be covered with cellulose film, such as some hermetically sealed pouches, added brilliance is imparted to the foil. This can be enhanced by suitable reverse printing on the film in opaque and transparent inks or through the use of colored adhesives.

Foil is printed commercially most commonly by the rotogravure, flexographic and letterpress processes. The gravure method is applicable to large-volume production, such as for butter wraps, oleo wraps, beer labels and carton overwraps, and is distinguished by fineness of line, a wide range of tone value and good reproducibility in both line and solid area.

Excellent print qualities on foil are also being obtained by the flexographic and letterpress processes, both of which are economical for moderate-size runs.

The use of higher-strength aluminum alloy 3003 is increasing, especially for food containers. Many foods, both raw and cooked, are now merchandised so that they are frozen, stored, shipped, sold, heated and served in the same container. Today a large variety of frozen foods are sold in foil containers, including fruit, meat, chicken and tuna fish pies, as well as complete dinners with turkey, chicken, chopped steak, fish sticks, tamale, shrimp creole, chow mein, etc. More types of foods will be included in the near future. (See "Aluminum Foil Packages," p. 336.)

It has been predicted that frozen baked goods will be marketed on a large scale within the next several years and aluminum foil is expected to be important in their packaging.

Foil covers imprinted with color facsimiles of the contents are also finding greater use with foil food containers. The combination of foil cover and container facilitates merchandising, and the entire package can be heated in the oven when necessary.

Semirigid, all-foil containers are also being used to merchandise florist and nursery products, such as seedlings and young plants, for supermarket sales. Here foil is able to increase sales by introducing convenience, cleanliness and attractiveness to products not ordinarily distributed in large volume through such sales outlets.

Another new product is the disposable foil broiler tray for steaks, chops, chicken, franks, etc. This serves both as a package and as a broiling aid, saving the housewife the unpleasant task of scouring pans and oven.

When used on the outside of a package, or in conjunction with an air space on the inside, foil will act as an insulator and this quality challenges future exploitation. One recent development combines aluminum foil and heavy paper in the construction of a corrugated, spiral-wound container body offering insulation with strength. This construction, reportedly, will be used for many interesting packaging applications for the storage and transportation of perishables with maximum protection.

Foil-paperboard combinations are finding greater use for carry-home, hot-food containers, drinking cups, brown-and-serve trays, cake trays, frozen-food containers and others.

Aluminum-foil packages are ideally suited for vending-machine sale and much is still to be done in merchandising warm nuts, pastry, candy, hot coffee, soups, chips, franks, burgers, etc., with flavor preserved by using foil.

TABLE II

Nominal thickness, inches	*Mullen bursting strength, lbs./sq. in.*	
	Min.	*Max.*
0.0008	8	15
0.0010	11	21
0.0015	22	37
0.0020	40	60
0.0030	75	100


PREST-O-WHITE
WHITEWALL CLEANER
Spray Type
SQUEEZE BOTTLE
Arden
DICED SHERBET
PINEAPPLE
SHERBET
PINEAPPLE
SHAVE
Clean up
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Film

BAKELITE Polyethylene Resins

Film made from BAKELITE Polyethylene is being used in an increasing number of ways to package an increasing variety of products. Laminated to foil, it provides a strong, high-speed heat seal. Laminated to other films, it imparts chemical resistance and lower moisture vapor transmission. Fabricated into bags and wrappers, it protects contents while keeping them visible. Used for drum liners, it prevents attack by chemical contents.

Virtually any product that must be safeguarded against moisture, soiling, or contamination may be considered for packaging in this film. Frozen and fresh foods, household articles, fishing bait, chemicals, hardware, and even liquids are among the many different items being packaged in it today.

Film made from BAKELITE Polyethylene retains its toughness and flexibility even at low temperatures—service temperatures range from minus 67 deg. F. to plus 180 deg. F. It has a low rate of water vapor transmission, yet permits the passage of gases, so that contents can "breathe." As a result, vegetables packaged in bags made from it will keep fresh for longer periods than when unwrapped.

Other features of film made from BAKELITE Polyethylene include resistance to attack by food, corrosive chemicals, water, solvents, oil, grease, brine, most acids and alkalies. It is odorless and tasteless.

Extruders of film made from BAKELITE Polyethylene may offer it in translucent, pastel and brilliant colors. When specially treated by extruders, it can be printed in colors. Various widths are available, and thicknesses range from 1 mil up.



Vegetables stay fresh, clean, visible, and protected from handling when packed in film made from this material.



Candy bags, heat-sealed, show their clean, tempting contents while keeping them fresh and flavorful.



Laminated to foil's inner side, film forms a tough heat-seal on high-speed machinery.



Product and brand visibility is outstanding with these polyethylene film bags. Contents are safe from soiling.

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"BAKELITE," "KRENE," and the Trefoil Symbol are registered trade-marks of UCC



Locks and their keys in these film bags are examples of hardware packaging that doubles as point-of-purchase display.



With a double liner of polyethylene film, conventional iron drums are used to carry phosphoric acid.



The manufacturer of these fresh or frozen coffee rings finds polyethylene film bags unmatched for yeast dough protection and keeping qualities.

KRENE Cast Vinyl Film

This film is characterized by outstanding transparency, high gloss, and good tear strength. It is produced in various degrees of flexibility. It has excellent tensile strength, dimensional stability and resistance to chemicals, oil and water. In unplasticized grades, it is non-inflammable, odorless, tasteless, and unaffected by aging.

KRENE Cast Vinyl Film may be printed, laminated to foil and other surfaces, and fabricated into bowl covers, bags, and packages. It forms a strong heat-seal. Thicknesses range from .001 to .012 in.



Superior clarity and gloss of cast vinyl film make it ideal for envelope windows. Toughness and flexibility resist puncturing even by hardware.



Liquids can be packaged in foil with an inner laminate of cast vinyl film to provide a strong, high-speed heat-seal and add toughness.

Envelope of highly transparent cast film on this paintbrush lets shopper see bristles and feel their flexibility without risk of damage.



Coatings

BAKELITE Polyethylene Based Coatings

BAKELITE Polyethylene coatings can be applied to metal, foil, cellophane, cloth, or paper. They are characterized by excellent chemical resistance, insolubility, and low moisture vapor transmission. Being tasteless, odorless, flexible, and cold-resistant, they are especially suited to food packaging.

Applied to paper, they have good grease resistance and adhesion, even after sharp folding. Their high gloss adds to consumer appeal. They permit the passage of certain gases while resisting the passage of moisture vapor. Used to upgrade paraffin wax, polyethylene results in coatings with higher blocking temperatures, reduced rub-off, greater tensile strength, and stronger heat-sealed bonds.

Fiber containers for resins, waxes, and chemicals are made from papers coated with BAKELITE Polyethylene. Their contents can be poured hot, then allowed to cool, after which the user can strip the container away, since the polyethylene is an excellent release coating. Used to coat metal drums, polyethylene guards against chemical attack, permits re-use, and protects contents from contamination by metal.



Ice cream outer-wra... coated with ... fortified with polyethyle... resin has higher gloss, stronger heat-seal, greater resistance to ... off and cracking at low temperatures.



Coated inside with polyethylene, cellophane bags can carry foods in their own juices. Coating adds toughness and resistance to tearing and abrasion.



Waxes fortified with polyethylene improve bread wrappers by reducing rub-off, raising blocking temperatures, forming a stronger heat-seal. Surfaces are glossier, printing enhanced.

BAKELITE Vinyl Resin Based Coatings



Cardboard food containers, and bottle caps coated with vinyl resins resist abrasion and moisture, can be tightly heat-sealed. Coating won't flake off at low temperatures.

Tough, glossy, strongly adherent, coatings based on BAKE... Vinyl Resins are formulated for dip, brush, spray, or roller ... cation. Usually clear or transparent, they may also be gi... wide range of colors. They strongly resist cracking, peeli... fading.

Coatings based on BAKELITE Vinyl Resins can be us... metal, paper, and foil. Baked on sheet metal, they with... stamping, drawing, or spinning operations without cra... Solution-coated on paper or foil, they add strength a... tough... and provide a strong heat-seal. Paper with these ...oatings ... easy to fabricate, can be cut, scored, or folded.

Molded and Blown Plastics

BAKELITE Phenolic Plastics

Bottle caps and closures molded of BAKELITE Phenolic Plastics have long been standard for drugs, toiletries, foodstuffs, wines, liquors, and other products. They are readily and uniformly molded to meet GCA specifications, thereby producing non-binding closures that are easy to thread on or off.

These materials are characterized by light weight, dimensional stability, good mechanical strength, and excellent finish. They are used for boxes and dual-use containers, signs and stands, and self-service dispensers. Their durability and non-corrodibility make them suitable for the working parts of "action" displays.



Bottle caps molded of BAKELITE Phenolic Plastics have detailed, highly finished surfaces, good color. They are strong, attractive, low in cost.

BAKELITE Styrene Plastics

Outstanding clarity and brilliance, dimensional stability, light weight, and low cost combine to make BAKELITE Styrene Plastics an excellent packaging medium. They can be molded to sharp, clean details. They may be either brightly colored or colorless — transparent, translucent, or opaque. They have excellent resistance to water, strong alkalies, and non-oxidizing acids.

BAKELITE C-11 Plastics are acrilonitrile-styrene copolymers which have added toughness and marked resistance to soaps, detergents, oils and fats, food chemicals, cosmetics, coffee, tea, and citrus peels.



Hairbrush gift box of molded styrene has gold base, transparent top. Makes an attractive, sturdy display package, takes heavy handling in shipping and by shoppers.

BAKELITE Rigid Vinyl Plastics

These materials are suitable for specialty closures of novel design. They are thermoplastic, and can be compression or injection molded to close tolerances, resulting in a smooth, high-gloss finish and fine detail. They can be given a wide range of colors — transparent, translucent, or opaque.

BAKELITE Rigid Vinyl Plastics are odorless and tasteless, and resistant to moisture and chemicals. They have good dimensional stability and impact strength.



Lotion dispenser pump parts molded of rigid vinyl plastics retain their dimensions despite long use, resisting wear and essential oils.

[illegible]

Applied to cloth by calendering or spread coating, they provide excellent tear strength, heat-sealability, toughness, and resistance to water, aging, repeated flexing, and abrasion. Their flexibility is retained at low temperatures.

Coatings based on BAKELITE Vinyl Resins are odorless and tasteless. They are resistant to moisture, alcohol, food, beverages, and most chemicals. They are non-flammable, and can be embossed and printed.



Wrapper of cotton cloth coated with vinyl resins keeps moisture in meat, retaining freshness. Can be printed with brand name.

Molded and Blown Plastics

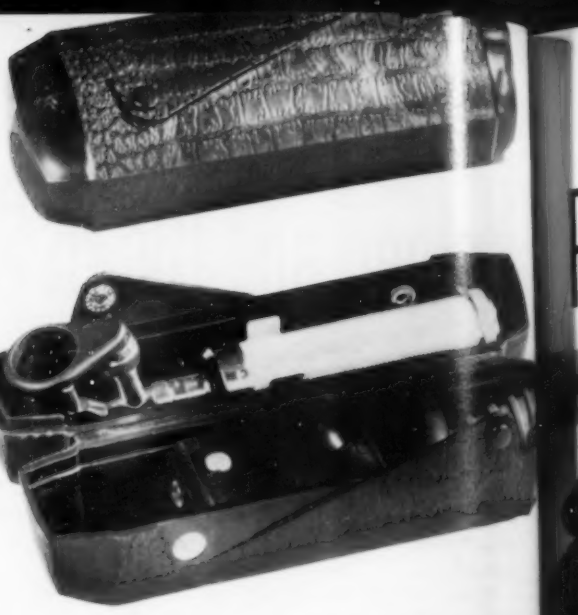
BAKELITE Polyethylene Plastics

These translucent thermoplastic materials retain their inherent flexibility over a wide temperature range. They are tough and resistant to shock, and will not shatter or smash. They are highly resistant to water, corrosive chemicals, and solvents. They have no taste or odor.

Molded into bottles, boxes, and numerous special containers, BAKELITE Polyethylene Plastics are applicable to a wide variety of designs and surface textures. They are highly suited to mass production methods of fabrication and packaging.

Since they are non-porous, containers molded from polyethylene are impervious to dirt, and are unaffected by a wide variety of contents. Their extreme lightness in weight helps reduce shipping costs. The soft quality of the polyethylene also affords protection for delicate items.

The broad range of uses for BAKELITE Polyethylene Plastics includes "squeeze bottles," standard bottles and jars, carboys, acid containers, closures, miscellaneous boxes, cases, and containers.



Molded in one piece, with reinforcing ribs and alligator-pattern surface, this case holds delicate medical instruments securely, keeps them sterile.

Medicine bottles molded of polyethylene resist chemical attack, won't break and dispense contents when squeezed.



This pharmaceutical vial molded from polyethylene has close-fitting, hinged lid, opens or closes with one hand. Won't shatter if dropped on bathroom floor.



Chemically inert, drum cap molded of polyethylene is a seal, a pouring spout, and a recapping device. Seals tightly without a liner.



Adhesives



Adhesives made from BAKELITE Vinyl Resins are strong, resistant to moisture, low temperatures. Tasteless, odorless. Used for leakproof containers.

BAKELITE Vinyl Resins for Adhesives

Having unusual flexibility and strength, forming a bond that resists impact, oils, and greases, these materials are used to bond many porous and non-porous materials, including cloth, cardboard, paper, metal, porcelain, stone, leather, wood, and many plastics. They are used for cold-set and hot-set bonding, and are colorless, odorless, tasteless, slow-burning. Thermoplastic, they permit heat-and-pressure laminating of non-porous materials. They are soluble in organic solvents. Blending them with phenolics adds resistance to cold-flow and water.

Rigi Sheet Materials

BAKELITE Rigid Vinyl Sheets for Signs and Displays



Three-dimensional signs formed from rigid vinyl sheets are printed in various colors, have excellent toughness and durability, are easy to keep clean and fresh.

BAKELITE Rigid Vinyl Sheets are excellent for counter signs and displays. They can be multicolor printed, then readily heat-formed to three dimensions. Once formed, they retain their shape despite exposure to water, humidity and normal temperature change. A damp cloth keeps them clean. They withstand long, hard service — won't crack under normal use, warp, fray, or fade. They are non-flammable, and resist alkalies and most strong acids, oil, and grease.

These materials can be obtained in clear transparent, and colored translucent or opaque. Sheets come with a "calender" finish, or may be press-polished or matte-finished on both sides, or press-polished on one side, matte-finished on the other. They are available in several standard widths and thicknesses.



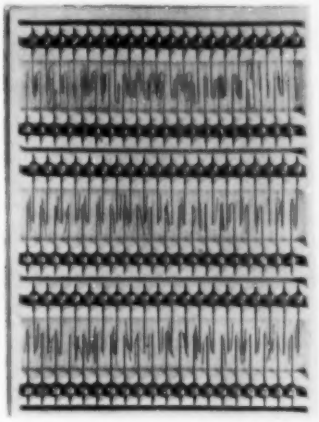
Nuts and bolts are displayed in precisely-fitting recesses formed into this printed sign made of rigid vinyl sheet. It's resistant to handling, oils, grease, and chemicals.

BAKELITE Rigid Vinyl Sheets for Packaging

BAKELITE Rigid Vinyl Sheets are useful for packaging such articles as Christmas tree ornaments, flowers, jewelry, cosmetics and foods. They are light in weight, durable and flexible—resist warping and cracking. They are odorless and tasteless, and withstand most chemicals, oil, and grease, as well as temperature and humidity changes. They do not support combustion.

These sheets are readily heat-formed to three-dimensional shapes. They accept multicolor printing in perfect register before forming. They are available in either clear transparent, or colored translucent or opaque, in several standard widths and thicknesses.

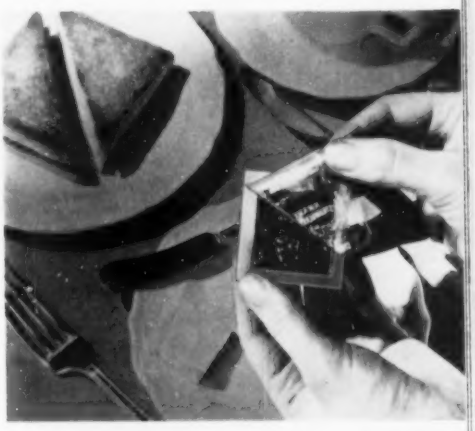




Hypodermic needles are held safely and firmly in place on this tray formed from rigid vinyl sheet material. Tray's dimensional stability, toughness, and flexibility are important features.



Jewelry findings, packaged in recesses in BAKELITE Rigid Vinyl Sheet and covered by BAKELITE Cast Vinyl Film, are uncovered separately as needed, preventing tarnish.



Individual portion packs of jelly are made with small dishes formed from rigid vinyl sheet — resistant to food acids, greases, handling. Easily filled on high-speed machines.



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PROPERTIES	METAL FOIL	SPECIALIZED ALUMINUM-FOIL COMBINATIONS—HEAT-SEALING TYPES				
	Aluminum	*Foil–Paper–Foil Combination, Heat-Seal Coating*	*Foil–Water-Resistant Adhesive–Paper–Microcrystalline Wax–Porous Tissue*	*Cellulose Acetate–Resinous Adhesive–Foil–Heat-Seal Coating*	*Paper–Waterproof Adhesive–Foil–Heat-Seal Coating*	*Scrim–Polyethylene–Foil–Vinyl Film Combination*
GENERAL						
Forms available	Rolls, sheets	Rolls, sheets bags	Rolls, sheets bags	Rolls, envelopes	Rolls, envelopes	Rolls, pouches
Clarity	Opaque	Opaque	Opaque	Opaque	Opaque	Opaque
Thickness range, in.	0.0002-0.006	0.003	0.0044	0.0025	Approximately 0.005	Approximately 0.016
Maximum width, in.	54	–	–	–	36	36
Area factor, sq. in./lb. (approximations)	10,250 for 0.001 29,200 for 0.00035	5,500	6,500	5,900	4,800	2,660
Approximate specific gravity	2.7	–	–	–	–	–
MECHANICAL						
Tensile strength, lb./in. TAPPI #T-404M	9-118*	29	19	21	23	35
Elongation, % TAPPI #T-457M	2.1-26	2.7	2.9	2.4	1.6	11.5
Bursting strength (Mullen), lb./sq. in.	4-165*	39	19	50	47	130
Tearing strength (Elmendorf), gm.	5-425*	60	15	40	135	880
Seal strength (Suter), lb./in.	–	3	1	2	4-5	5-6
Folding endurance (M.I.T.)	4-18	154 at 1 kg.	55 at 1 kg.	240 at 1 kg.	–	–
CHEMICAL						
Water absorption in 24-hr. immersion, %	Zero	–	–	–	Zero	–
Permeability to gases	Negligible	Negligible	Negligible	Negligible	Zero	Zero
Water-vapor permeability (Southwick-Rhoades), gm./24 hr./100 sq. in.	Negligible	Negligible	Negligible	Negligible	Negligible	Zero
Resistance to acids	Poor to good	Poor to good	Poor to good	Poor to good	Good	Poor
Resistance to alkalies	Poor to good	Poor to good	Poor to good	Poor to good	Good	Poor
Resistance to greases and oils	Excellent	Excellent	Poor	Poor	Good	Good
Resistance to organic solvents	Excellent	Affected by some solvents	Affected by some solvents	Affected by some solvents	Affected by some solvents	Affected by some solvents
PERMANENCE						
Resistance to heat, °F. (limiting temp.)	700°	120°	120°	120°	120°	160°
Resistance to cold, °F. (limiting temp.)	−120°	Depends on laminating agent, etc.	Depends on laminating agent, etc.	Depends on laminating agent, etc.	−65°	−65°
Resistance to sunlight	Excellent	Excellent	Excellent	Good	Excellent	Excellent
Dimensional change at high R.H., %	None	None	None	None	None	None
Resistance to storage	Unaffected	–	–	–	Good	Good
Flammability	Not combustible ordinarily	–	–	–	Partly combustible	Partly combustible

*Values for these properties necessarily cover a wide range. For more specific values refer to tables on p. 126. SOURCE: The values in this chart were obtained from various sources and are believed to represent acceptable commercial standards. Special grades of some of these materials may be obtained whose properties differ from the values shown. There are many specialized combinations of foil with other materials. Manufacturers should be consulted for additional information or for new uses of their materials. For manufacturers' names, see the Buyers' Directory at back of this book, especially the heading "Foil—Coated, Laminated, etc."

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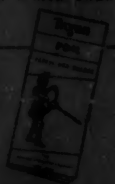
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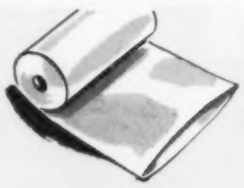
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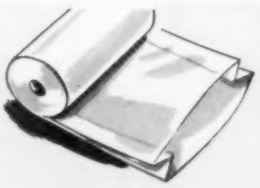
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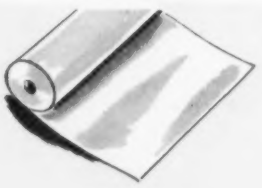
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Laminated materials

by HERBERT T. HOLBROOK*

In the field of flexible packaging materials, the search for the perfect all-purpose single web is never ending. Even with the great advances in surface coating, the packaging engineer must still turn to laminated structures to meet his most exacting demands. Only by combining two or more plies of similar or dissimilar materials into a single sheet can he progress beyond the limitations of any one material.

For example, the packaging engineer can unite the decorative appeal of thin aluminum foil with the mechanical strength and greaseproofness of glassine paper—and thereby produce a perfect candy wrapper. Or, if he is seeking a combination of transparency, stability, high moistureproofness and exceptional seal strength, he can laminate cellulose acetate to Pliofilm and thus obtain an ideal material for packaging pharmaceutical tablets or powders on high-speed, automatic packaging equipment. If his problem is concerned with waterproofing of cases for overseas shipment, the most positive and most economical protection can be obtained by making liners which consist of two plies of kraft paper laminated together with a heavy layer of asphalt.

Through the process of laminating, therefore, an infinite variety of combinations of materials can be made available to meet requirements of specific packaging problems that cannot be solved by any single web. The selection of materials, including the laminant, depends upon the properties which are desired in the composite sheet.

* General Manager, Flex-Vac Div., Standard Packaging Corp., New York.

Materials

All the basic flexible packaging materials are being used today in laminated forms. Greatest in volume, of course, is paper, in its entire range of weights and types.

Tonnagewise, laminations of paper to paper undoubtedly still lead. Wax-laminated glassine to glassine for carton liners, asphalt laminations of kraft for case liners and glassine-kraft combinations for coffee bags are typical examples.

Next in importance would probably be the many combinations of aluminum foil. Although laminations of foil to paper and paperboard predominate, foil is also combined with acetate, to cellophane and to practically all thermoplastic films—for example, Pliofilm, polyethylene and vinyl—where special functional or decorative effects are desired.

Finally, all the transparent films in use today are being laminated: to themselves (cellophane to cellophane or Pliofilm to Pliofilm), or to one another (polyethylene to saran, cellophane to Pliofilm, acetate to vinyl), or to various opaque materials (acetate to foil, cellophane to paper, saran to paperboard).

For many end uses, however, even a combination of two materials will not meet performance requirements, so that a third or even a fourth component must be added. A good example of a multi-ply structure is the four-web combination of cloth, polyethylene, kraft paper and vinyl film that is the standard water-vapor barrier for Armed Forces Method II.

An example of commercial applications would be the foil-paper-foil-Pliofilm pouch used for some dehydrated soup mixes, where a superior moisture barrier must be combined with a seal of high strength and some thickness to flow around particles trapped in the sealing areas.

The art of laminating depends not only on the selection of component webs but on the adhesive used in bonding them. Often the function of the adhesive or laminating agent is merely to hold the webs together. The demands on the adhesive may be very light, as in paper-foil laminations used by some cigarette manufacturers, where a glue adhesive is applied in narrow strips to achieve maximum economy. In other applications, the successful operation of the composite sheet may be entirely dependent on the strength, durability and integrity (that is, uniform, complete coverage) of the adhesive. A good example would be the acetate-Pliofilm lamination cited, which is used for pharmaceutical packaging, where lack of perfect adhesion between the lamination components would quickly result not only in unsightly delamination but also

(*This article continued on page 142*)

PHOTOS COURTESY SHELLMAR-BETNER



Heat-sealed roll wrap of reverse-printed acetate and polyethylene-coated foil protects all-weather film.



Re-usable tobacco pouch is made of polyethylene-coated foil laminated to reverse-printed glassine.

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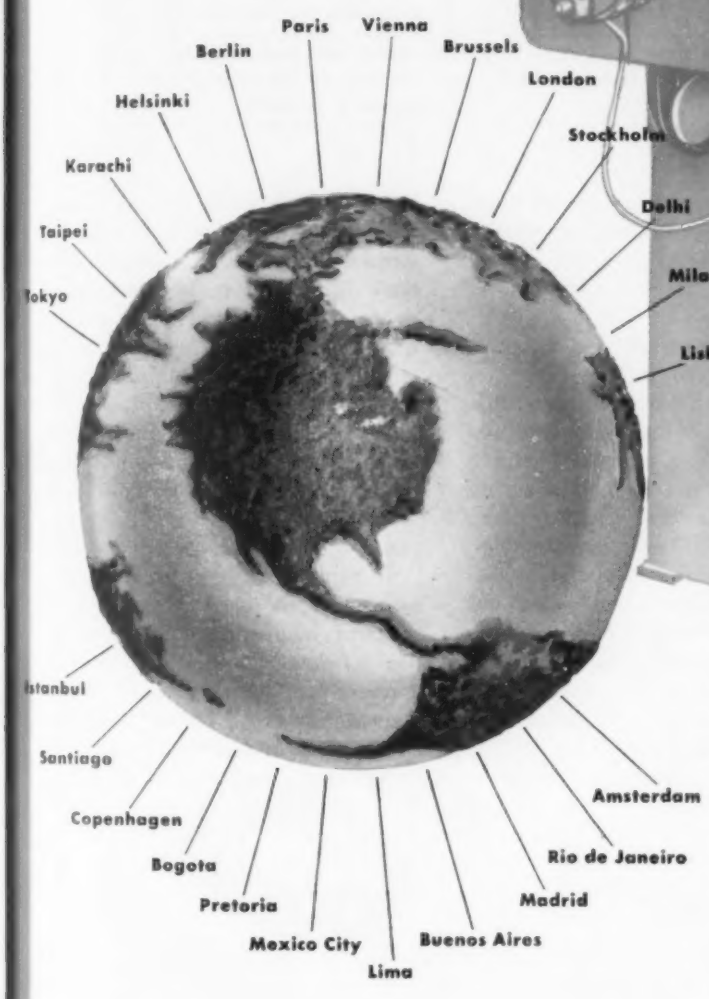


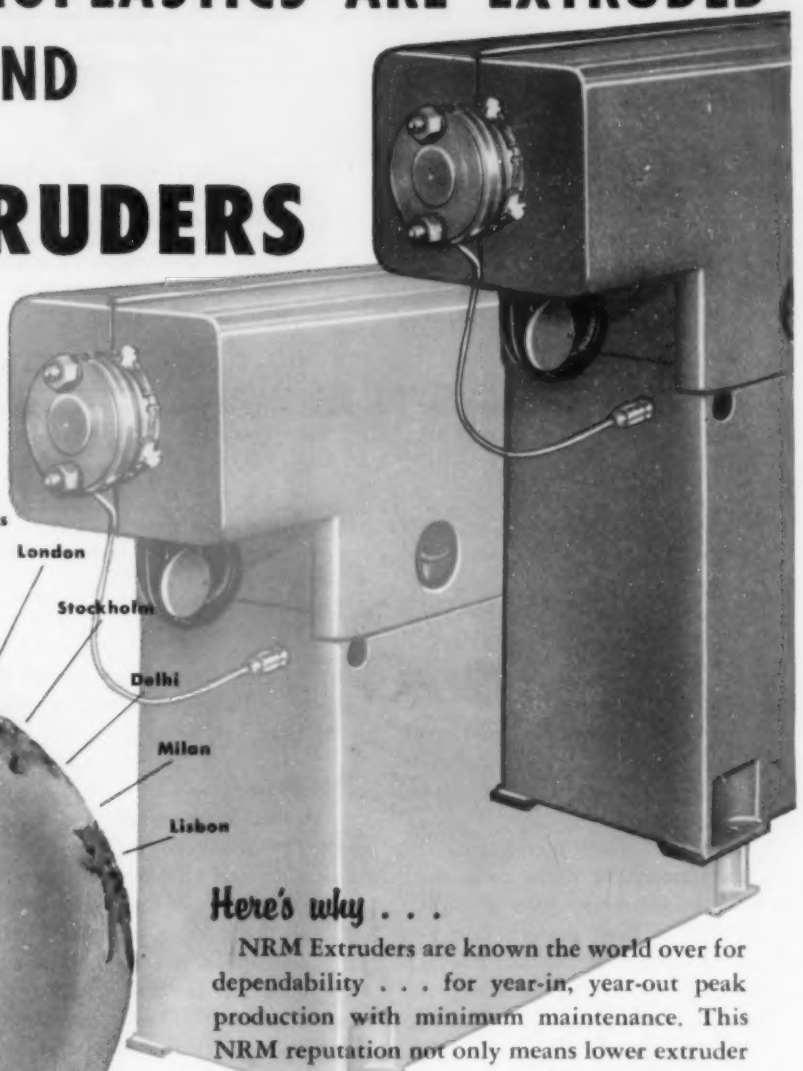
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TABLE I—LAMINATING AGENTS

Type	*Example*	*General properties*	*Remarks*
AQUEOUS SOLUTION	Dextrins, animal glue, etc.	Greaseproofness. Great strength and stiffness.	Low cost. Water to be removed after combining. Usually used on papers or water-wettable materials.
EMULSION	Rubber (latex), resinous mixtures, etc.	Flexible. Waterproofness (limited). Limited water-vapor resistance. Can be used on porous surfaces.	Water to be removed before or after combining. Usually used on papers or water-wettable materials.
SOLVENT SOLUTION	Resins or gums, synthetic and natural rubbers in solvent solution.	Wide range of water-vapor resistance, waterproofness, greaseproofness, flexibility and strength.	Solvent to be removed before or after combining. High unit cost. May be used with any material, depending on choice of formulation and application techniques. Generally for laminations of plastic films, cellophane, etc.
HEAT LIQUEFIED	Waxy, asphaltic or resinous mixtures.	Wide range of water-vapor resistance, waterproofness, greaseproofness, flexibility.	Low to high unit cost. May be used with any materials. Wide range of application temperatures, from about 140 deg. F. to 400 deg. F., depending on composition.
	Fused resin, no-wax resin, etc.	Dependent upon resin used. Can be waterproof, flexible, moistureproof, greaseproof, gastight, etc.	Moderate to high unit cost. Only certain resins are capable of this type of use and special equipment is required.

in total loss of necessary protection for the product.

In many other cases, the laminating agent itself contributes a major share to the over-all function of the composite material.

In the case liner mentioned, the primary function of waterproofness is obtained by the heavy layer of asphalt laminant. The kraft paper serves primarily as a sort of container which permits practical utilization of the properties of the asphalt. In certain applications of plastic-film laminations, the use of a relatively heavy, pressure-sensitive adhesive contributes greatly to the flexibility of the structure and acts as a kind of shock absorber.

Table I covers briefly the general characteristics and applications of the four types of laminating agents in use today. (See also, "Summary of Packaging Adhesives—Types, Properties and Uses," p. 172.)

Equipment

As would be expected with operations involving so wide a variety of materials and adhesives, there is little standardization of the equipment used in the laminating process. Laminating equipment is seldom bought "off the floor." It is more or less custom built as the result of extensive engineering study and cooperation between the user of the equipment and the equipment builder. Problems concerning the type of materials to be run, the adhesives to be used, the types of applicator roll, maximum and minimum widths desired, the weight of the adhesive to be applied and control of the thickness needed must be balanced against the machine speed desired, the need for flying splice equipment, space requirements, etc.

Modern laminating equipment can cost from a few thousand to several hundred thousand dollars. To this direct cost must usually be added the cost of air compressors, steam or other heating or cooling devices and, possibly for large operations using solvent-type adhesives, the cost of expensive solvent-recovery equipment.

In general, the type of adhesive to be used is the basic consideration in selecting laminating equipment. Figure 1 below shows diagrammatically the flow of material through a typical laminator where a hot-melt adhesive, such as wax or asphalt, or one of the

(*This article continued on page* 146)

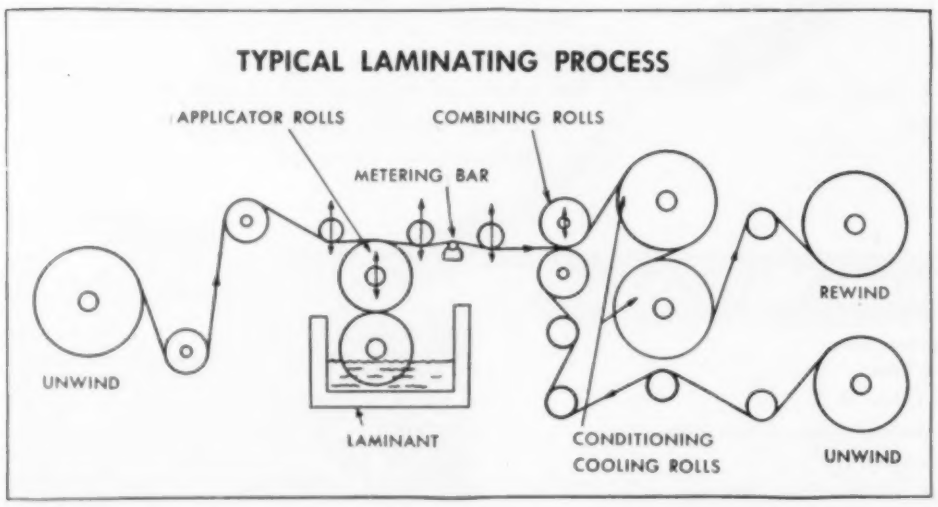
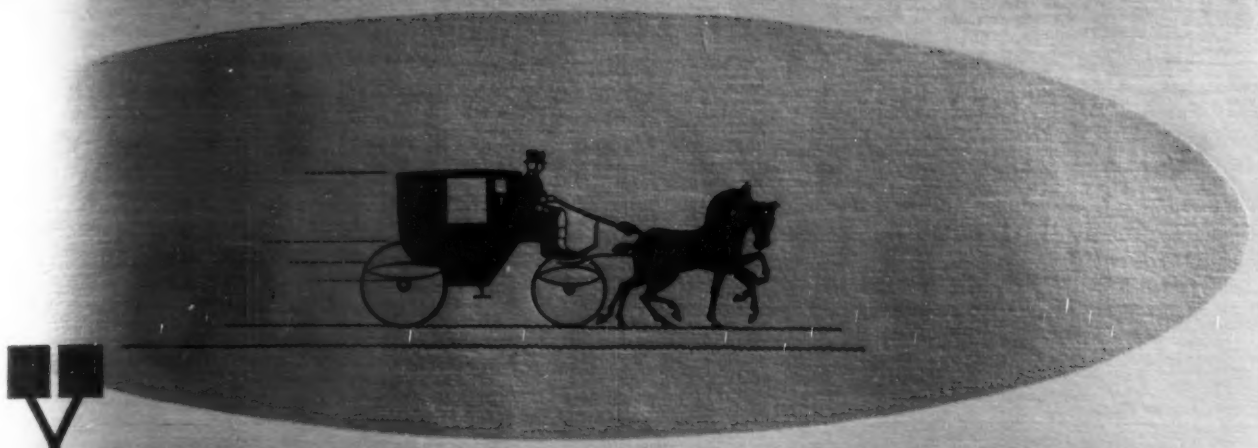


Fig. 1 — Diagram at left shows method used in the production of a two-ply structure. This set-up utilizes either a hot-melt, aqueous solution or latex-type adhesive.



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Celanese Plastics for packaging are the products of many years of pioneering research and development in plastic application. These plastics — films, sheeting and molding compounds—were designed to supply the three essentials that modern merchandising methods demand of today's packages: 1) product protection; 2) product visibility; and 3) an over-all sales-stimulating attractiveness and appeal.

PRODUCT	DESCRIPTION	APPLICATION
ACETATE FILMS 	Celanese* Acetate Film—a leading packaging material for over 25 years — has crystal clarity, distinctive "sparkle," non-cockling flatness, water and grease resistance, moisture-vapor permeability (the "breathing" wrap), dimensional stability, printable surface, excellent aging. From 0.0007" to 0.002"—rolls, cut sheets—clear transparent and transparent tints—high gloss or mat finish. Fabricated by slitting, cutting, laminating. Heat- or solvent-sealable. Cemented to other materials with standard adhesives.	Window boxes, bags, envelopes; wraps; combination wraps; decorative ribbons. For fresh foods, dehydrated foods, drugs, cosmetics, metal parts, precision equipment, paper products and other products requiring long shelf. As a vehicle for gold stamping foil for laminating.
ACETATE SHEETING 	Acetate Sheeting is available from 0.003" to 0.250"—in continuous lengths, cut sheets — clear transparent, tints, opaque colors, special effects. Can be vacuum or pressure formed, blanked, cut, stamped, riveted, cemented, punched, drilled, stitched, embossed, laminated — manually or by machine. In vacuum and pressure forming, a special form of extruded sheet adaptable to deep draws has been developed, with toughness and rigidity permitting thinner gauges.	Rigid transparent containers and covers; "contour" and "blister" type packages, formed displays.
ACETATE MOLDING COMPOUNDS 	One of the toughest molding plastics, Celanese* Acetate offers the merchandiser many opportunities for unusual package design and beauty. It combines high impact, tensile and flexural strength, shatter resistance, color permanence, and freedom from objectionable odor. Acetate molds and extrudes readily with a high gloss finish. Available in a number of formulations — in a wide range of transparent and opaque colors.	Molded containers, product-package combinations, re-use containers.
POLYETHYLENE FILMS 	Celanese* Polyethylene is tough, tear-resistant, flexible over a wide temperature range, relatively permeable to oxygen and other gases, virtually impermeable to moisture vapor and most corrosive chemicals, non-toxic. Celanese production methods produce polyethylene film outstanding for clarity and evenness of gauge. In automatic operations, Celanese Even Gauge Polyethylene tracks better, requires fewer roll-to-roll machine adjustments. Thicknesses from .001" to .010"—rolls, cut sheets—natural finish, printable surface. Can be cut, slit, heat sealed, vacuum and pressure formed.	Packaging for fresh produce, frozen meats, poultry, dehydrated foods, bakery products, soft goods, silverware, hardware, machine parts, toys, jewelry and candy. Laminated to cellophane and other films for vacuum pouches for meats, wet or liquid products.
POLYETHYLENE SHEETING 	Heavier gauge polyethylene (sheeting) is available in thicknesses from .015" to .060", in rolls and cut sheets. It can be easily fabricated by cutting, blanking, stamping, stitching, drilling, punching, embossing, heat forming, heat sealing. It can be vacuum or low pressure formed into complex shapes or given interesting surface textures. Such forming methods can be accomplished with relative economy since mold can be actual article to be packaged.	Containers and tank covers, drum liners, packages for bulk seeds and bulbs, bulk containers for hygroscopic and corrosive materials.

Celanese packaging experience is readily available to you in specific literature, technical bulletins, and personal assistance from the Celanese Sales Staff and Product Service Department. Celanese Corporation of America, Plastics Division, Dept. 144K, 290 Ferry Street, Newark 5, N.J. Canadian affiliate: Canadian Chemical Company, Ltd., Montreal, Toronto and Vancouver.

Celanese* PLASTICS

*Reg. U. S. Pat. Off.

PHOTO COURTESY BIEGEL PAPER CORP.



Soup-mix pouches are made of glassine laminated to polyethylene-coated foil.

aqueous solutions or emulsions is to be applied. These are the types of adhesives generally used where substantial tonnage is involved and where precise control may not be so important as high speeds and low operating costs. Such machines can operate at better than 1,000 ft. per minute.

Solvent-type resin-laminating equipment can be similar in operation to the process shown in Figure 1, but would call for a heated tunnel between the metering bar and the combining rolls. The function of the heated tunnel is to drive off all solvents before uniting the two webs. The longer the tunnel, the faster the theoretical operating speed, although there is a practical limit to tunnel length. This limit is set by excessive material losses incurred whenever the web breaks as it travels through the tunnel. High investment and more space are required.

For laminations utilizing solvent-type resins, speeds in excess of 300 ft. a minute are exceptional and the process is generally limited to laminations combining plastic films with other plastic films or with foil. Similar or even the same equipment can also be used for depositing resin-type coatings. (See also, "Coating and Laminating Equipment," p. 526.)

Developments

Combining similar materials through the use of hot-melt adhesives has long been an established science. The use of dextrins, starches and glues to combine similar materials (as in the fibreboard and corrugated container industry) or dissimilar materials such as foil and paper goes back years.

Technical difficulties have been substantial. Certain films, especially polyethylene, have surface characteristics that discourage the formation of a strong adhesion. Many of the transparent films, particularly cellophane, saran and Pliofilm, are not noteworthy for their dimensional stability and, when laminated to materials having components with dissimilar coefficients of expansion and contraction, are subject to wide variations in temperature and humidity. Delamination is difficult to control.

Finally, most of these materials are relatively high in price. Initially, the cost of combining them is high. The need for technical control at every stage of processing is exacting—and yet the final cost to the user must be low enough to enable him to sell profitably in a highly competitive market. That this is all being done can perhaps best be proved by describing briefly some outstanding postwar laminated packages.

Sauerkraut has been one of the last American foods to be dispensed generally by cracker-barrel merchandising. A low-cost staple for millions of families, it could not—in mass distribution, at least—take on the extra cost of glass or metal containers. On the other hand, no single film had the seal strength or liquid- and moisture-retaining characteristics and the impermeability to oxygen needed to protect kraut successfully throughout self-service distribution. Converters have solved the problem by combining two plastic films and making bags to hold from 1 to 2 lb. of kraut. Both cellophane laminated to polyethylene and Pliofilm laminated to itself are being widely used in this interesting package. The result is a convenient, low-cost container that allows the shopper to see what she is getting, a labor-saving package for the retailer, and a made-to-order device that enables the packer of sauerkraut to build up brand recognition and all-season distribution for his product.

It has been known for years that dry active yeast loses its potency slowly but surely unless it is protected from moisture and oxygen. Vacuum packing in cans in which air has been displaced by an inert gas is the answer so far as protection is concerned, but this is impractical packaging for the small-unit sizes.

The first step in seeking a solution to the problem was to fabricate small laminated foil and paper pouches, each holding a few grams of the dry yeast. This provided good protection against moisture but not against the deterioration which was caused by entrapped air.

The next step was to improve the lamination by replacing the inner heat-seal coating with a laminated thermoplastic film. This made possible seals tight enough and strong enough to hold an inert gas, so that air could be displaced with nitrogen in the packaging operation. The result was a "right size" package for the consumer with product protection guaranteed for at least a year.

One of the most dramatic recent developments has been the commercial application of vacuum protection in a flexible package. Here again the packaging problem could not have been solved without laminated materials, for single films either lacked gas impermeability or were impractical for use on the special equipment that had been developed for vacuumizing and sealing.

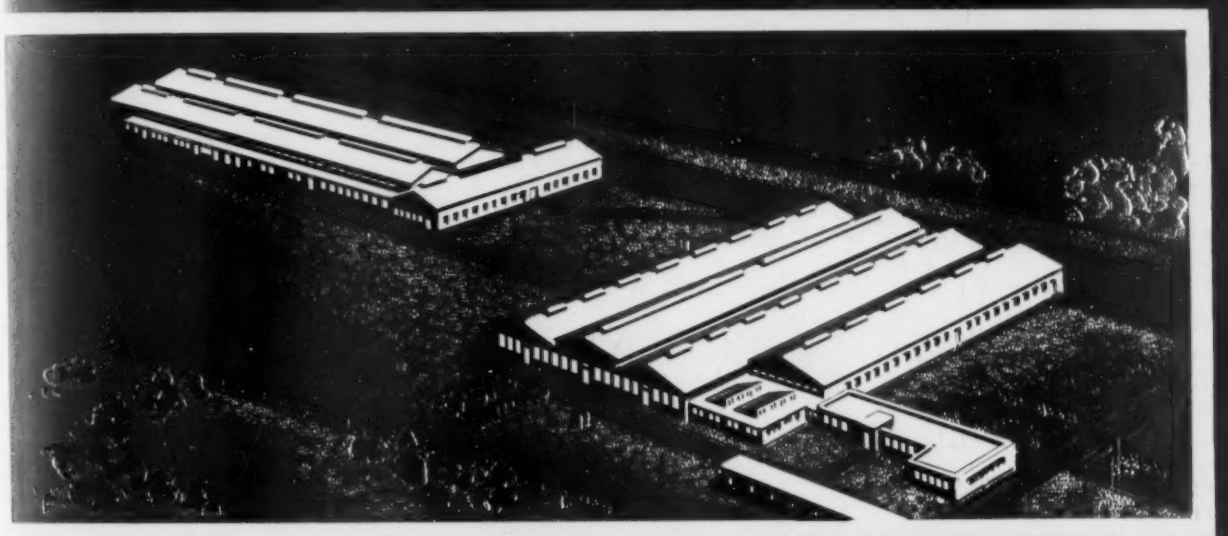
The lamination developed by the converter for this unusual requirement consists of cellophane, which is the gas barrier and outer component, and polyethylene or Pliofilm, which provide added strength, moistureproofness and a strong seal. A solvent-type resin is used as the laminating agent.

Another great advantage of such a combination is that it permits printing on the reverse side of the cellophane and the laminating is done with the printing itself sandwiched between the two webs. Thus all the attractive gloss of the cellophane is utilized, yet the inner film prevents any product from being contaminated by the inks.

Applications of these laminated materials have been successful in vacuum packaging sliced meats and cheese products, dill pickles and even nylon stockings. A high 28.5- to 29.0-in. vacuum is accomplished, and under proper conditions, rancidity, mold or other manifestations of oxidation can be retarded for extended periods of time—not so long as is possible in metal or glass vacuum containers, but long enough to meet the packer's needs at relatively low cost.

With the exciting possibilities of new types of films now in the laboratory stage, with the continued improvements in adhesives and with further developments of faster and more versatile packaging machinery, the field of laminations surely promises almost limitless potentials and challenges in the packaging field.

for the growing foil industry . . .



Foil Mill Completed 1950

Foil Stock Mill Completed 1955

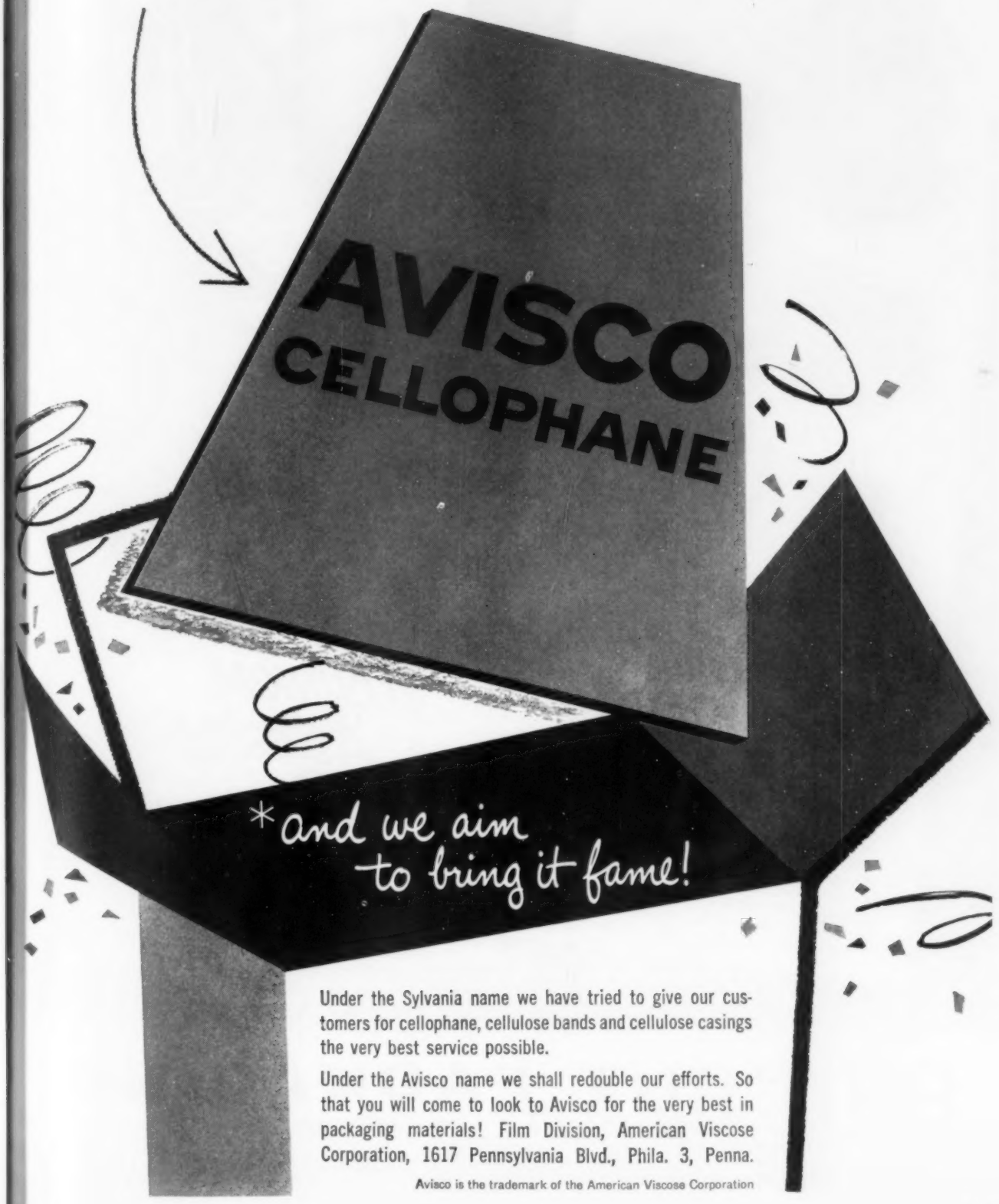
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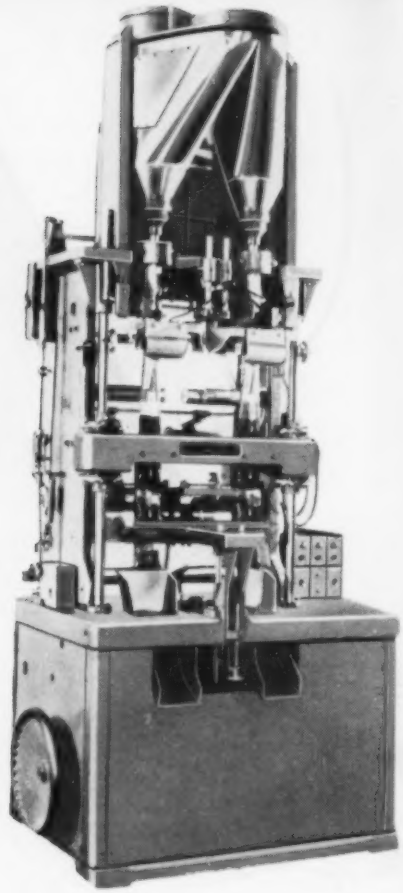
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You'll find over 100 varieties of three basic films—cellophane, "Mylar" polyester film, and acetate—available to help you obtain a package exactly suited to the protective needs of your product. A Du Pont film combines protection and durability with visibility—puts your package in line with the buying preferences of the modern shopper.



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Millions of readers see full-page, 4-color advertisements like these—part of a national consumer advertising program that helps create extra demand, extra sales for products using Du Pont films. Free reprints are available for our customers' use. E. I. du Pont de Nemours & Co. (Inc.), Wilmington, Delaware.

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See "FRONTIER," Reynolds great dramatic series, Sundays, NBC-TV Network.

REYNOLDS



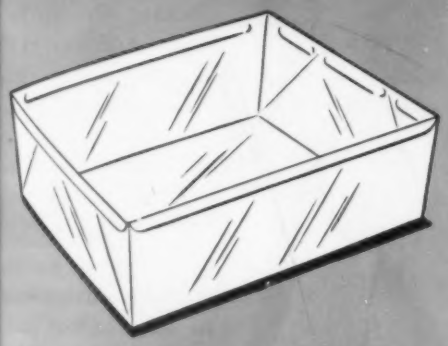
REYNOLDS DINNER PAK*

This is the rigid, compartmented tray with no sharp edges, now increasingly popular. Reynolds supplies these trays in the standard size for frozen dinners, together with all other packaging requirements except the blank carton.



REYNOLDS CASS-ROL PAK*

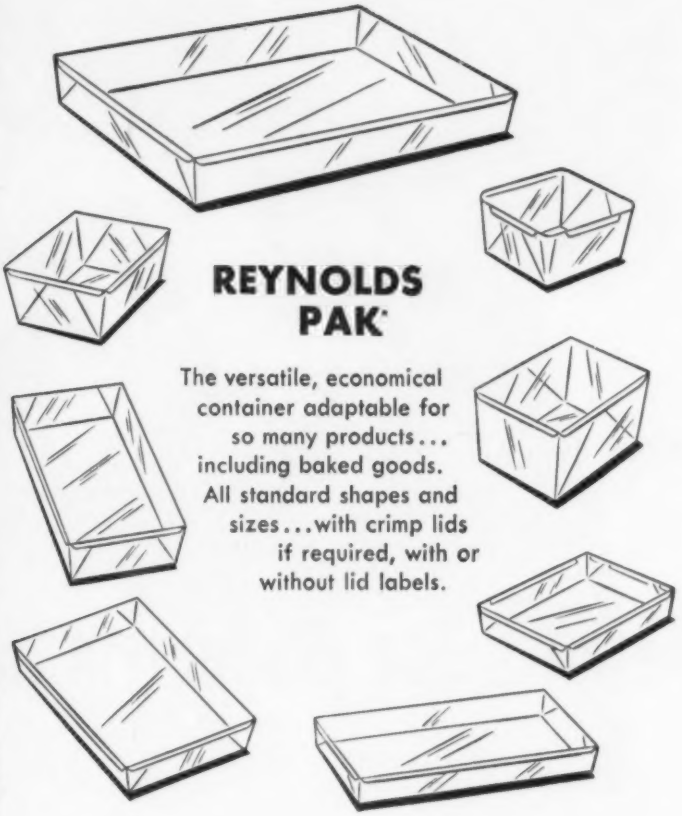
The traditional crimp cups for fruit and meat pies and other uses... available in all popular sizes. Cartons from your supplier, then Reynolds sparkling printed Aluminum Foil Overwraps for added sales appeal.



REYNOLDS WRAP PAK*

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Cellu-Craft design engineers know how a package motivates purchase. And they've been using that "know-how" to design and produce flexible packages for Cellu-Craft customers for almost twenty years.

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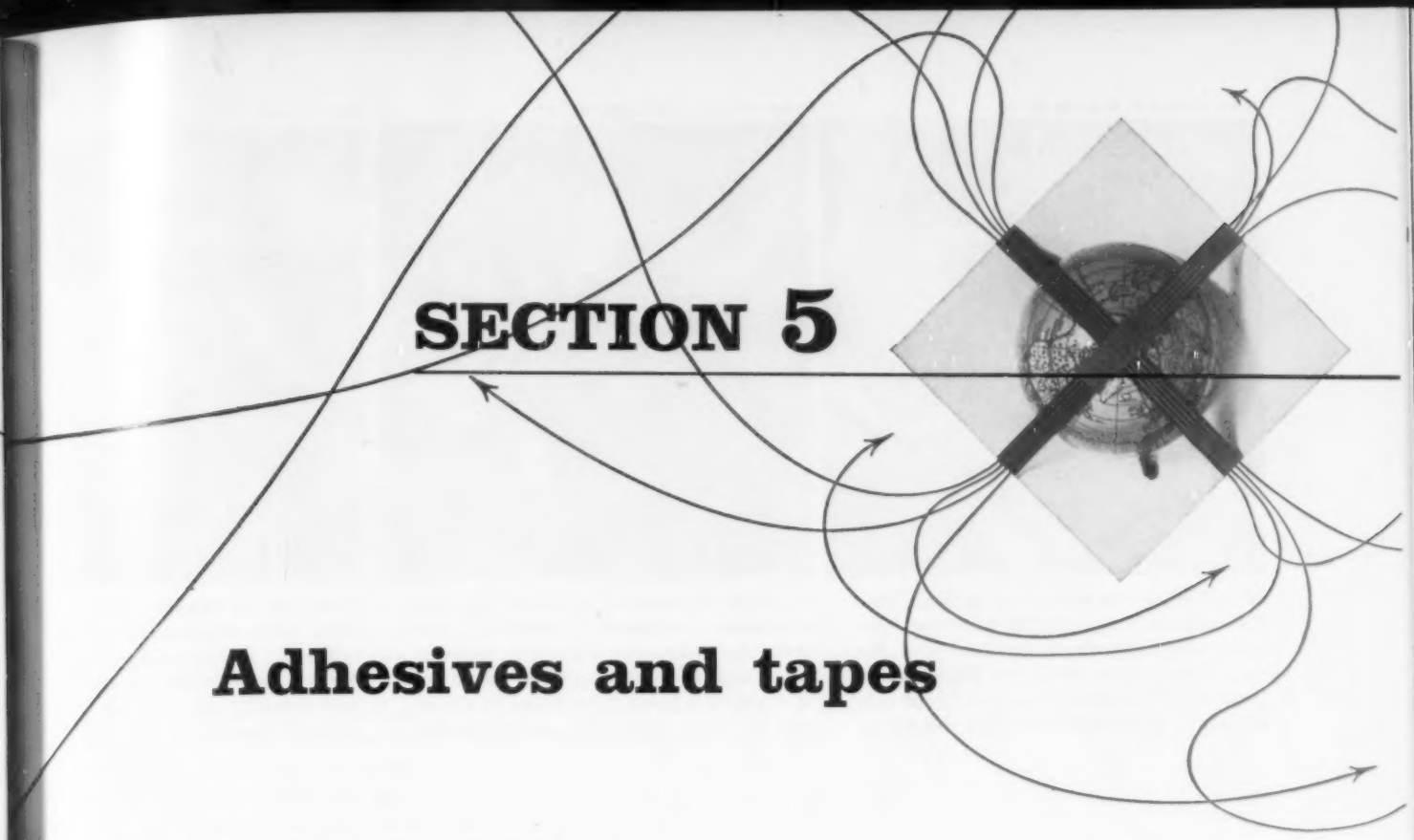
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SECTION 5

Adhesives and tapes

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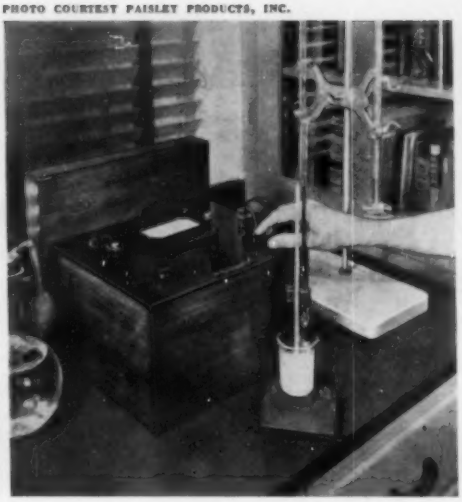
Tapes Used in Packaging 176

PHOTO COURTESY H. B. FULLER CO.



Liquid adhesives are mixed in large vats. Raw materials are brought to mixer from floor above by chute running into the vat. Water, steam heat and liquid chemicals are then added. Operator keeps side of mixer free from churning adhesives.

PHOTO COURTESY PAISLEY PRODUCTS, INC.



Careful laboratory research on raw materials, chemical additives and formulas maintains the high performance level of adhesives. Here the pH of a dextrine is being determined by means of a glass electrode potentiometer.

PHOTO COURTESY H. B. FULLER CO.



Viscosity, or liquidity, is measured on viscosimeter before adhesive leaves factory. This checks formulation of adhesive and liquidity as compared with previous batches of the product.

Adhesives used in packaging

Though adhesives are employed in practically every type of packaging, they are so completely functional and largely unnoticed they are usually taken for granted by the buyer and user of packaged products. The content and cost of the adhesives in a package are infinitesimal, yet the value is critically high because the adhesive affects both efficient processing and, eventually, successful package performance.

Choice of an adhesive combining maximum performance and economy involves a high degree of expertness, because of the "tailored" properties the adhesives industry can offer from the wide range of adhesive types available to the packager today.

The following articles discuss the various types now employed in the packaging field. Included are articles dealing with the "Importance of Adhesives in Packaging," "Vegetable Adhesives—Liquid and Dry," "Flexible Animal Glues," "Casein Adhesives," "Resin Emulsion and Latex Adhesives," "Lacquer Adhesives," "Heat-Sealing Adhesives," "Hot Melts" and "What to Tell Your Adhesives Supplier."

A chart blue-printing the many types, properties and uses of adhesives used in packaging, "Summary of Packaging Adhesives—Types, Properties and Uses," appears on p. 172.

Importance of Adhesives in Packaging

by Don Pascal*

Packaging has been and will continue to be a dynamic, expanding field. Most manufacturers have realized the importance in competitive markets of getting their products to the consumer in packages that not only protect the commodity from shipping and storage hazards but also impel the purchaser to select a given brand in preference to a competitive one. Whether a product be packed in paper, metal, glass or plastic film, most packaging methods require adhesives in the factory manufacturing the particular packaging medium and the plant in which the packaging is actually done.

Figures on the annual production of various packaging materials have, in most instances, shown a marked increase over the past decade. Tonnage figures for packaging adhesives have shown the same trend; but, because no central reporting agency has an accurate tabulation on adhesives used only for packaging, it is difficult to give precise figures to show the exact size of the present packaging adhesives industry.

However, sometimes even inexact figures are helpful in establishing approximate magnitude and with this in mind the following statistics (annual basis) are given:

Starch and dextrin adhesives—350 to 375 million pounds.[1] In addition 200 to 225 million pounds of starch are employed in manufacturing corrugated board.

Nonwarp or "flexible" (animal-glue base) for packaging—approximately 20 million pounds.[2]

Resin base (primarily polyvinyl acetate) adhesives—more than 70 million pounds.[2]

Few people realize the importance of adhesives in packaging—an importance which is out of all proportion to the cost of the adhesive. Yet many of the most efficient packaging methods would be impossible without suitable

* Vice President, National Starch Products, Inc., New York.

[1] "A Market Survey of the Adhesives Industry," M. V. Donnelly and J. R. Skeen, 1952.
[2] Adhesives Manufacturers Assn. of America, New York.

adhesives. For example—adhesives which will bond paper surfaces within a few seconds; those which will operate without throwing or splashing on machines operating at speeds of several hundred units per minute; adhesives which will bond the many new films for flexible packaging and enhance their properties by combining the functional properties of films plus adhesive in a single laminated sheet.

Product lines of the adhesives manufacturers have expanded and changed over the years to meet the varying demands of the packaging industry. As packaging operations have passed from manual to machine and then to faster machine speeds, adhesives have changed from slow-setting and slow-drying starch and flour pastes to tacky, fast-setting dextrin adhesives. To achieve even faster setting in addition to other properties, such as water resistance, grease resistance and better final bonding, resin adhesives—particularly emulsions—were introduced. Hot melts which are supplied in the solid form and rely upon heat to adjust the viscosity have also been introduced where even greater speeds are required and where it is necessary not to have any water present. However, they require proper application and temperature controls. New products are usually brought out for two reasons: first, to do a better or more efficient job at lower final cost; second, to do a job which cannot be done with existing adhesives.

The evolution within the field of starch and dextrin adhesives extends back so far—a period of 50 years or more—that it is hard to trace the many changes which have contributed to their present development.

The resin adhesives, however, are a very good illustration of how adhesive manufacturers have added to their product lines to meet new requirements of the packaging field. The resin field started some 25 years ago when cellophane was introduced to converters. Starch, dextrin and protein glues were useless in adhering moistureproof cellophane and a line of lacquer adhesives was developed for wrapping, laminating, bag manufacturing, etc.

Polyvinyl acetate emulsions, which came into the adhesive field prior to World War II, were first used for adhering cellophane and acetate windows into boxes and envelopes and for laminating these films to paper. These same bases were then formulated to meet the entirely new and more stringent requirements of overseas military shipments. The outstanding requirement was water resistance, but, in addition, the adhesives had to be sufficiently fast setting and easy to use to permit application on conventional gluers.

As a result of war experience with the advantages of resin adhesives, the use of resin emulsions has greatly expanded, in large part at the expense of starch and dextrin types previously used. In addition, many new lacquer products have been made up for laminating operations on polyethylene, vinyl and polyester films.

The above is an example of a decided trend within the industry. There are also numerous instances of specialty products being formulated to meet the unusual requirements of an entirely new machine or new packaging medium. The adhesives industry is a "service" industry and prides itself on its ability to meet the ever-changing needs of packagers.

It is reassuring that at this time the principal production of the adhesives industry is based on domestic raw materials in good supply so that wide price fluctuations and shortages are not anticipated.

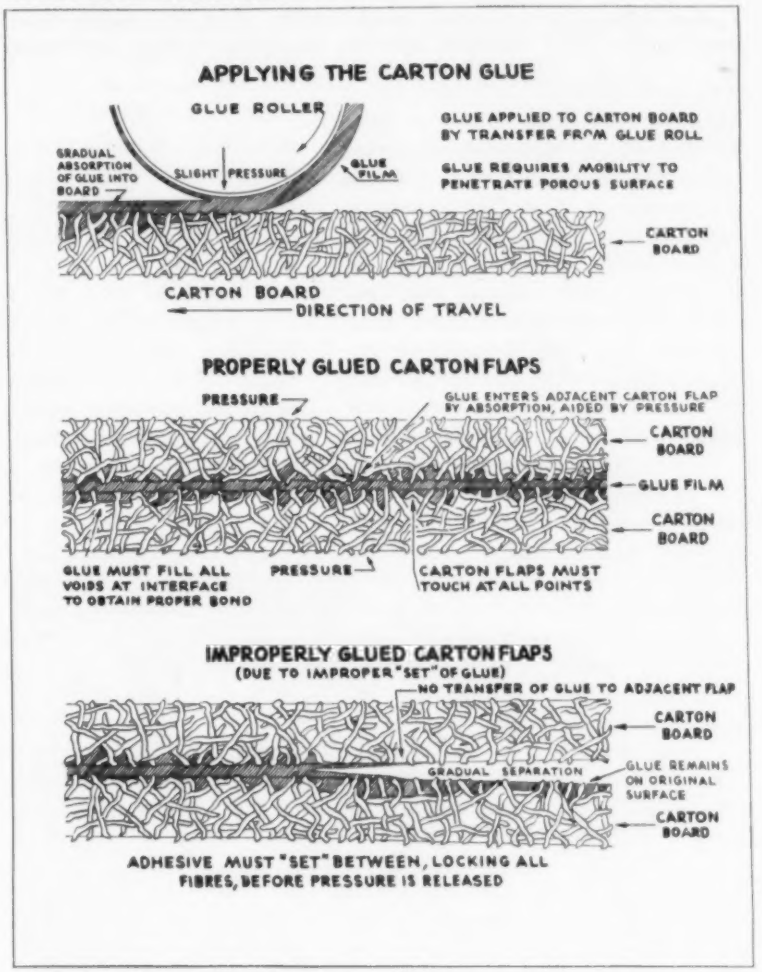
Vegetable Adhesives—Liquid and Dry

by Earl C. Lenz*

The largest single class of adhesives used by the packaging industry is that compounded from starch or

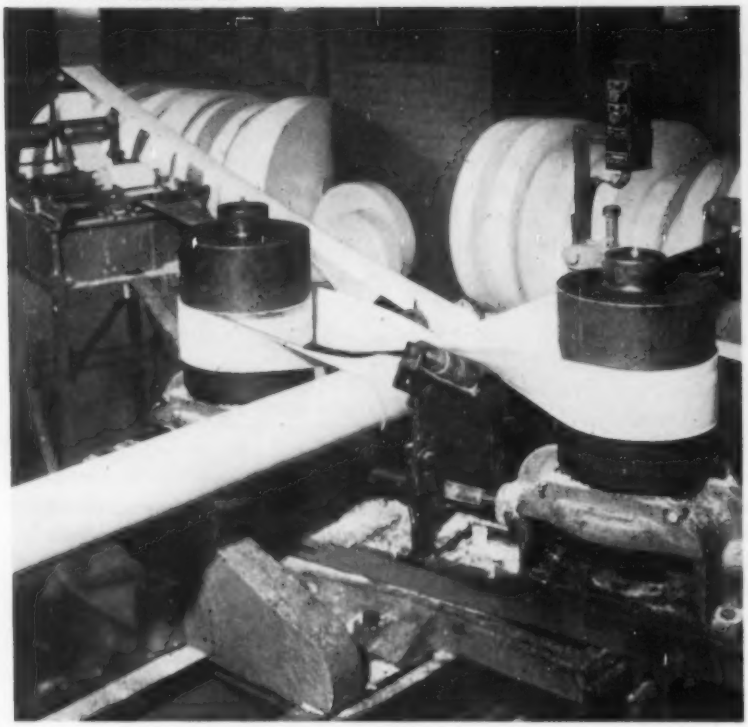
* Vice President of Sales, Paisley Products, Inc., Div. of Morningstar, Nicol, Inc., New York.

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Diagrams of method of gluing cartons show difference between properly and improperly glued cartons and critical application of adhesives in packaging. Carton failure or sifting of contents may result from such badly glued flaps as those in bottom diagram. Here, adhesive has not set fast enough, leaving too little surface film for transfer to second flap, or has penetrated one surface too deeply.

PHOTO COURTESY THE BORDEN CO.



Casein adhesive's properties—machinability, fast set, water resistance—make it an excellent adhesive for spiral-winding application.

its derivatives. These adhesives are called "vegetable adhesives," since the starches used in their formulation are of vegetable origin. Corn, tapioca, potato, wheat, rye and sago starches comprise the raw materials most useful to the vegetable-adhesive compounder. Water-soluble gums are another source of natural raw materials. To the adhesive chemist gum arabic is the most important in this class.

Commercially, vegetable adhesives are produced from raw flours and starches, treated or modified starches, dextrins and natural, water-soluble gums, alone or in combination. With these basic ingredients many chemical additives may be blended to achieve specific and required properties. Raw starches, when employed in adhesives, usually produce pastes with high moisture content, unless the starch is enzyme treated or acid treated to break down the starch to a more fluid form. Thin boiling starches produced by such methods are useful in some forms of packaging pastes, such as bag paste and label paste. To obtain quick tack and high solids in a machinable adhesive, the raw starch is usually converted by torrifaction processes to white, yellow or dark, canary-colored dextrins. Unlike the starch from which they are made, dextrins are soluble in water, have a relatively low viscosity and with iodine solution give (rather than the starch-amylose blue color) either a red or brown coloration, or in some instances, no color at all.

In order to achieve machinability and uniform application on packaging machines, the two most fundamental properties needed in dextrins are viscosity and solubility control. The wide range of dextrins obtainable from corn, tapioca and potato starch provides the adhesive chemist with the building blocks from which modern vegetable adhesives are made. These adhesives are available in dry form or as prepared liquids.

The dry adhesives are readily prepared for use either by simply mixing with cold water or by mixing with water and heating until properly dissolved. With either method various chemicals may also be added to modify the intrinsic properties of the natural bases. Alkalis, acids, salts, plasticizers and solvents in varying proportions may be used to achieve changes in body, penetration, flexibility and specific adhesion. Preservatives are usually included in the adhesive to prevent bacterial and mold contamination.

In addition to the above, which are usually furnished as intimate mechanical mixtures, there is available a type of dry vegetable adhesive produced by dehydrating a previously prepared liquid adhesive. Redissolved in water with proper agitation, this latter type of adhesive is quite adequate for some kinds of packaging operations.

Prepared liquid vegetable adhesives are manufactured from these same basic raw materials. They are produced under the direction of skilled chemists and made to conform to thoughtfully predetermined standards. In the specially designed equipment of a modern liquid-adhesive plant, it is possible to use many chemicals that are not practical in a dry vegetable adhesive. Drawing upon the latest advances in chemical and mechanical engineering, the vegetable-adhesive plant of today is a far cry from the barrel and paddle era of a few short years ago. Thermostatically controlled heat, electronically timed equipment and modern filtration methods, all under laboratory supervision, assure uniformity not otherwise attainable. Hence one can expect broader latitude and greater uniformity with respect to performance from commercially prepared liquid vegetable adhesives.

Vegetable adhesives will undoubtedly continue to maintain their position of importance in the packaging field because of their many inherent advantages. In addition to being the least costly adhesives, their natural properties and attributes are such that they will not be readily replaced by the more costly resins or latices.

Being essentially odorless, non-toxic and clean machining, they are ideally suited to most packaging requirements. Vegetable adhesives may be formulated to give quick, strong tack and, where necessary, films may be produced having excellent retack features upon remoistening.

Physically, these adhesives may be produced in viscosities ranging from very thin fluids to almost waxlike pastes. In chemical reaction they may be either acid, neutral or alkali. Their normal colors vary from almost water white to deep brown. The natural color of the adhesive is easily modified through the addition of dyes or pigments to facilitate operation or inspection of the applied glue line on high-speed equipment.

Vegetable adhesives have excellent storage characteristics, the dry forms when properly stored maintaining their quality practically indefinitely.

The properly formulated liquid varieties generally remain usable for periods up to 12 months under conditions of proper storage. Since the prepared liquid vegetable adhesives are frequently compounded to give optimum performance within a more limited period of time, it is usually considered that best results will be obtained if the adhesive is consumed within three months of manufacture.

Vegetable adhesives are usually recommended for, and used upon, combinations where some form of paper is one of the elements being bonded. The joint produced is almost invariably stronger than the internal strength of the paper and fibre-tearing bonds result.

Vegetable adhesives have machining qualities superior to those of all other types. They are less susceptible to changes in temperature and humidity and, when properly compounded for the operation, usually require minimum readjustment during a running cycle. Vegetable adhesives are less likely to "build up" on the rollers and transfer mechanism; but should such build up occur, it is easily remedied by simple washing with hot water or an easy scraping operation. To achieve optimum machining qualities, vegetable adhesives are produced from tapioca dextrin which is considered a superior raw material. Tapioca-based adhesives usually maintain a more uniform viscosity upon aging and, having a somewhat "gummier" nature, are better suited to high-speed operations.

Corn dextrin is, for most uses, quite suitable and, because of lower cost, finds its way into many uses where very quick tack and highest-speed operation are not vital.

Starch or dextrin-based adhesives produce bonds having excellent aging characteristics with good resistance to high humidity and to low temperatures and, when properly compounded, good resistance to rapid thermal changes.

Vegetable adhesives may be modified with resins to achieve greater water resistance, to obtain better specific adhesion to certain obstinate surfaces and to improve speed of set on certain machine operations. This type of modification requires the complete knowledge of the compatibility of the ingredients of the trained adhesive chemist.

Typical examples of vegetable adhesives used in the packaging industry are sealing glues for shipping cases and for small cartons, tube winding, labeling glues and glues for bottle labeling.

Flexible Animal Glues

by Chesley S. Young*

Flexible glues fall into two basic types—true flexible and nonwarp. True flexible glues are used for edition book binding of quality books, soft-side luggage and flexible notebook covers. These flexible compounds may be made to set extremely fast for high-speed machine work or to set extremely slowly for hand work.

The nonwarp products are produced primarily for the manufacture of set-up boxes, hard-side luggage and hard-side case making for books. Nonwarp flexible glues may be compounded to meet the rate of set demanded by the application and have the flexibility suited to the finished product. The nonwarp feature gives even surfaces in a candy or hat box.

The three basic ingredients for both types of flexible glues are highest quality glue, plasticizers and water. Other essential ingredients include the preservatives, defoamers, tackifiers, colors and perfumes. The glue and ingredients are selected for specific uses and machine applications.

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Glues in themselves have some flexibility in their dry form (10% moisture), but real flexibility is obtained by increasing the moisture content through the addition of hygroscopic materials. The type of hygroscopic material or plasticizer is carefully selected to meet requirements of the final film and working properties. Many new plasticizers in use today have been introduced only in the past few years. New preservatives and moldicides have eliminated the possibilities of mold or putrefaction in flexible-glue compounds. Good defoamers are essential to the proper machining of flexible glues. Tackifiers are added to give the rate of set desired. Flexible glues must be free from objectionable odors, as many are used for food containers and in expensive luggage. Careful selection of raw materials and the use of modifying chemicals are of major importance.

Physical properties

Nonwarp flexible glues can be purchased in dry, semi-jelly or concentrated cake form. The dry form contains approximately 15% moisture, the semi-jelly approximately 50% moisture and the concentrated cake form approximately 25% moisture. True flexible glues are available only in the semi-jelly or concentrated cake form. Most of the real plasticizers are in liquid form. Some of the newer plasticizers are changing this.

Both types of flexible glues may be obtained in a wide variety of colors. Products may be perfumed, but the

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Half-gallon milk cartons come off the production line safely sealed on the botton by a quick-setting synthetic resin adhesive that has passed all pure-food and performance requirements and tests.

preferred products are usually bland. The pH of most flexible glues is near the neutral point. The bonding characteristics can be varied from very fast to extremely slow, retarded set.

Flexible glues are water soluble. However, industries have been built on the insolublized, flexible-glue films. The gasket and crown-cork industries are examples. The chemical reaction between animal glue and tanning agents, such as formaldehyde, goes on to completion regardless of the plasticizer present. The physical properties of a tanned glue are ideal for gasket work. The tanned glue is insoluble in oils and similar solvents. Though it is also insoluble in water it swells in water. A gasket that is exposed to both oil and water swells to give still tighter seals.

The compounding of flexible glues is directed toward two ends: (1) to make them suitable for machine or hand operation; (2) ultimate function and economy.

New developments in flexible glue are keeping pace with the new wrapping materials by the use of new plasticizers, solvents and tackifiers. New additives in flexible-glue compounds greatly change their characteristics, providing faster machining and greater economy. The new tackifiers permit the use of a wider variety of coated paper stock and other recently developed materials.

Casein Adhesives

by R. J. Lodge*

Casein, a by-product of the dairy industry, is obtained from milk from which the butterfat has been removed. The use of casein for adhesive purposes dates back literally thousands of years. Commercial casein is generally supplied as a cream-colored granular substance of particle size varying from 30 to 100 mesh. Suitable chemicals are added to casein to make dry casein glue. Solutions of casein and chemicals are also available for certain specialized applications and for greater convenience to the user.

Casein adhesives have inherent characteristics that make them suitable for many diverse gluing applications. For example, in wood gluing the choice of casein is dictated for laminating of timbers because of its gap-filling properties, its ability to cure at low temperatures, its ease of application and its durability under normal protected exposures. For paper gluing, casein glues have good machining characteristics and water resistance. As a label glue, casein gives good application properties, fast speed of set and water resistance.

Originally used for wood-to-wood gluing exclusively, casein and casein-modified adhesives now are used for gluing wood and paper to plastics, films, foils and metal. No single factor accounts for the variety of uses.

Casein glues are of two general types—those that gel at room temperature and those that form a bond through evaporation of water. Whereas casein does not give the fastest speed of set or greatest water resistance or any other single outstanding characteristic, it does provide a variety of desirable properties which can be modified and carefully controlled under competent direction.

The storage life of raw casein is normally considered to be about 2½ years. For dry casein glues the storage life ranges from three months to a year or more. Liquid casein adhesives may be usable for only a few hours after mixing or for up to six months or more at normal storage conditions (70 deg. F.). The aging of casein in both dry and liquid form is accelerated by exposure to high temperatures (above 80 deg. F.) and high humidities. Ideal storage is cool and dry. Most liquid casein adhesives are unaffected by freezing—an important factor in cold-weather shipments.

Bonds formed by casein adhesives have excellent resistance to both high and low temperatures. In wood gluing, for example, casein-bonded members remain glued when subjected to temperatures which burn the wood.

Under extremely moist or alternately wet and dry conditions, casein-glued joints gradually lose their strength and eventually fail from one of two causes—hydrolysis of the casein or destruction by micro-organisms. But casein bonds do not crystallize and well-glued joints made with casein glue will last indefinitely under normal interior conditions.

Resistance to micro-organisms can be substantially improved by the addition of suitable preservative chemicals to the glue or by treating the wood after gluing.

Most casein glues are easy to handle, spread easily and are not critical in film application, pressure or fit of parts to be glued. Foaming is sometimes a problem but usually can be controlled by the addition of suitable defoamers. In liquid glues, the defoamer is usually incorporated for the greater convenience to the user.

Casein adhesives are generally considered low in cost when compared with other adhesives which give the more water-resistant bonds. Equipment in which casein glues have been used can be readily cleaned with warm water. Some people make a practice of adding small amounts of mild alkali to the water used for cleaning. Equipment should be cleansed immediately after use, for casein adhesives develop water resistance upon drying.

In addition to casein adhesives as such, casein is frequently used with rubber or resins to impart its desirable properties. An example of this is the casein-latex combination which provides a bond to metallic surfaces.

Probably the most significant development in casein glues in recent years has been the development of ice-waterproof label glues for labeling on glass. The fast set, good machining properties, cleanliness and water resistance of casein label glues have resulted in their almost exclusive use for labeling of beer and soft-drink bottles. Another essential property of this label paste is that it can be readily removed in the bottle-washing machines. Since these machines use caustic soda in their cleaning solutions, the casein-glued labels are readily removed in the "soakers."

* Manager, Packaging Adhesives, Specialty Products, Chemical Div., The Borden Co., New York.

Resin Emulsion and Latex Adhesives

by Richard E. Smith*

One of the most significant advances in the adhesive industry during the past 10 years is the rapidly increasing use of resin emulsions and latex in adhesive compounding. Emulsions are, for definitive purposes, miniature spheres of resin or water-insoluble substances dispersed or suspended in water. Although latex originally described the milky sap of the rubber tree, it has been popularized to include man-made emulsions of synthetic, rubberlike ma-

* Technical Director, H. B. Fuller Co., St. Paul, Minn.

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terials. For simplification of this discussion, latex of natural or synthetic rubber will be considered a resin emulsion. On porous surfaces the water in an emulsion adhesive quickly penetrates, allowing the remaining resin solids to bond the two surfaces.

Adhesives may be compounded from a wide variety of available resins, including acrylic, phenolic, rosin and its derivatives, styrene, terpene, vinyl and many rubberlike polymers, such as butadiene-styrene, polyisobutylene and neoprene. The most widely used resin emulsions today for adhesive compounding are polyvinyl acetate and its copolymers. Most of the resins used in emulsion adhesives are synthetic in nature and can be tailor made to exacting specifications. Flexibility or toughness may be built into a resin by copolymerization, depending upon the choice of raw materials.

Resin-emulsion adhesives offer important advantages, including versatility, lack of odor, taste or color, excellent moisture and water-vapor resistance, wide compatibility, cold-setting, excellent shelf and functional life, ease of application, controlled setting speeds, high production yields, safety margin in bond strength, freedom from organic solvents and economy. They can be made to bond such a variety of surfaces that they have entirely replaced vegetable and protein adhesives for certain food-packaging applications. Without the fast "set" some of the the resin-emulsion adhesives possess, many packaging and sealing operations would be impractical.

Resin emulsions have become almost the universally used adhesive for fabricating transparent films into bags, carton and envelope windows, laminated sheets, etc. Even the bonding of metals and ceramics is now effected with emulsion adhesives.

All resin-emulsion adhesives are supplied in liquid form and may vary from thin fluids to stiff pastes. Since resin-emulsion adhesives are water based, they eliminate the necessity for expensive, volatile, flammable or frequently toxic solvents for dilution or clean up. Fortunately, resins may be compounded into colorless, tasteless, non-toxic and odorless adhesives, making them ideal for food-packaging applications. Bonding characteristics may be readily controlled from resin adhesives with very fast set, to those which possess delayed tack or set and those which are permanently tacky or the numerous pressure sensitive types.

The resistance of most resin adhesives to water vapor is excellent. Some may actually be submerged in water for weeks with no adverse effects. Others are unaffected by organic solvents, oils, temperature extremes or micro-organisms. The required characteristics of the final bond dictate to a large extent the choice of the base resin. In addition, a compounded adhesive may contain several different types of resin, each contributing specific properties to the final bond. A wide choice of organic plasticizers is available to produce almost any degree of flexibility or toughness desired. Specific solvents may be incorporated in an adhesive to penetrate surface coatings or to promote adhesion to nonporous surfaces. Others may be used to control or increase penetration.

One outstanding feature of most resin adhesives is good machining property. No matter how good a bond an adhesive forms, it is of little value for an automatic-sealing application if it will not perform in the machine from which it is applied. Emulsions, being less cohesive than solutions, are less apt to foam, string or throw during mechanical applications.

Resins may be blended with most other adhesive bases. Combinations with vegetable, protein or mineral bases are being produced. These take advantage of specific physical and chemical properties of the additive and frequently they prove more economical than a base entirely of resin. Starch-resin mixtures are widely used in paper-bag and carton fabrication, where once starch alone was used.

Resins are widely used on waxed food packages. Not only do they bond through waxed surfaces, but also they produce bonds which will withstand the extremely low temperature of deep-freeze units. Yet resins are used on packages which must be sterilized —resins which do not soften at elevated temperatures. Resin and latex emulsions have made it possible to laminate foils to paper for food overwraps. In almost every adhesive application where water resistance is expected, resin adhesives are given first choice. Resin adhesives are also used in such applications as case and carton sealing, foil and film lamination, folding and set-up box manufacturing, tube winding, wet strength paper-bag fabrication and other uses involving waxed, coated and plastic surfaces.

One of the latest developments for the use of resin adhesives is in the production of paper envelopes. Heretofore only highly soluble vegetable dextrins were considered to possess sufficient tack and remoistening ability for this use. Today resin adhesives have been developed which produce better bonds on envelope stock, tasteless seals and envelope flaps which are not affected by high humidities. This would immediately suggest their use for paper tape and remoistening labels. It is possible that the postage stamp will some day be affixed by means of a synthetic-resin adhesive.

Lacquer Adhesives

by F. P. Bartlett*

The user, or prospective user, of adhesives chooses a lacquer type of adhesive because of: the materials he is combining, which frequently involve one or more impervious surfaces; his particular demands for low- or minimum-moisture content; the ease of application; requirements for moisture or water resistance of the finished product; the functional value of the vehicle which is always some type of solvent.

The vehicle (or material used to dissolve or carry the active adhesive ingredients of a lacquer) is the essential difference between the lacquer and the emulsion-type adhesive and hot melt. Generally speaking, very similar raw materials (the functional adhesive ingredients) may be employed in either of these three types. These basic adhesive ingredients obviously differ from the water-soluble types, such as starches, animal glues and casein. Solvent, soluble, film-forming agents, resinous materials and plasticizers, dissolved and blended together, form a lacquer adhesive.

One of the simplest examples of a lacquer adhesive is plasticized polyvinyl acetate dissolved in some suitable solvent such as acetone. As previously suggested, similar raw materials frequently may be used in like proportions, formulating an adhesive as an emulsion or hot melt. But these three basically similar adhesives (the lacquer, the emulsion and the hot melt) are very different in their physical appearances. The lacquer is a clear, transparent liquid exhibiting considerable wet tack. Its viscosity is

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dependent upon the molecular weight of the polyvinyl acetate chosen and, to a much lesser degree, upon the plasticizer. Its drying rate is relatively fast as an open coating, considerably slower, however, than might be expected from the vehicle, acetone, due to the solvent retentivity exhibited by vinyls. It shows considerable tendency towards stringing.

The physical appearance of the emulsion is a white creamy to pasty liquid in its wet state and the viscosity is more dependent upon the type of emulsifier and type of plasticizer used than on the molecular weight of the polyvinyl acetate. The emulsion's drying rate is relatively slow as an open coating and very little tendency toward stringing is noted. The dried film is not so continuous as the dried lacquer film. Normally the dried film of the emulsion is more moisture sensitive than the dried film of the lacquer at room-temperature drying conditions. If comparable polymers of vinyl acetate are used, the dried-film characteristics otherwise are similar.

The hot-melt adhesive is a translucent solid at room temperature. The hot melt becomes fluid at elevated temperatures. Sometimes temperatures from 300 to 400 deg. F. are necessary for a workable viscosity. Again the viscosity of the hot-melt adhesive at any given temperature is directly related to the molecular weight of the polyvinyl acetate and to a much lesser degree to the plasticizer. It sets almost instantly as lower temperatures are reached.

The physical differences of this basic formula in its wet state usually determine the choice of type for any given job. If one or more impervious surfaces are to be combined, particularly if two are involved, more satisfactory results are usually obtained with a lacquer. This situation necessitates the evaporation of the solvent vehicle before combination is made. In general, smoother patterns of adhesive application may be obtained by the lacquer approach than by emulsions or hot melts. This is particularly pertinent in the more delicate laminations of films and foils where frequently the pattern of the adhesive layer contributes to the final appearance. Again, where moisture contribution from the adhesive in any combination may not be advantageous, a lacquer may be used.

Whether a lacquer or hot melt were chosen for its lack of moisture probably would depend upon ease of application, drying facilities, etc. Should the product have difficult water-resistant requirements, such as soaking or washing, the preferred choice would probably be the lacquer type. The vehicle of the adhesive usually is considered nonfunctional as to final adhesion in many fabrications, but it can facilitate processing. Unlike the emulsion adhesive, the lacquer adhesive can be adapted to almost any drying rate. Most film formers and resinous materials are soluble in one or more groups of solvents and a rather wide range of choice is usually available. So, too, a study of boiling points considered with vapor pressures usually permits a wide range of volatility to the formulator. Much less latitude in drying times is available, particularly in open assemblies, with emulsions or hot melts.

Considering the physical differences exhibited by lacquers and the drying characteristics which may be incorporated, it becomes clearer which fabrication is most satisfactorily accomplished with this type of adhesive. Many laminations obviously are most easily made with the solvent-vehicle type. Assemblies requiring relatively long open times, such as flocking, usually employ lacquer adhesives. For the typical packaging operation encountered, too much difficulty in dissipating the solvent is found. If the controlled evaporation of the solvent vehicle can be used advantageously in a fabrication, a lacquer adhesive should be considered.

Heat-Sealing Adhesives

by Mortimer E. Stern*

The use of heat-sealing adhesives is always characterized by one typical feature—the adhesive has been pre-deposited at the point of bonding and remains ready for use for an indefinite period. Unless subjected to heat, it does not deteriorate and remains unchanged. In application and use, it is analogous to the gum used on a postage stamp, with the difference that heat instead of moisture is used to reactivate the adhesive bond.

Heat-sealing adhesives are applied to paper, cloth, metal foil, transparent films, etc. and are used mainly for packaging purposes. Among the widely used compositions are those based on nitrocellulose, cellulose acetate, ethyl cellulose, acrylics, polyvinyl acetate, polyamides and rubber derivatives. Some materials, like the polyamides or polyvinyl acetates, may be used as hot melts, solvent solutions or water dispersions. Nitrocellulose can only be used from a solvent.

Heat-sealing adhesives are of several types:

1. Hot-melt adhesives. These are employed as a hot liquid produced by heating a solid thermoplastic material. Application is usually at a temperature from 250 to 300 deg. F., at which temperature the solid adhesive becomes a free-flowing liquid.

Asphalt is a common heat-seal adhesive of this type. Probably the most common, however, is wax by itself or combined with other thermoplastic materials. Wax-type, heat-sealing coatings are used on bread wrappers, potato-chip bags and a large variety of similar packages. Adhesion is by heat and pressure and usually by contacting two coated surfaces. The bond has a low tensile strength, typical of a special delayed-tack producing process, an important sealing requirement in those packages that must be easy to open, maintain the wrapper intact for reclosure and yet provide excellent protection in channels of distribution.

An interesting modification of the application and use of solid thermoplastic adhesives involves a special process.[1] In this method, the adhesive is applied in the usual manner by melting a solid adhesive and coating as usual. The deposited film, on cooling, is very sticky and can remain so for an indefinite period of time. However by treating the sticky coating immediately after application to the base paper, cloth, etc., with a chemical crystallizing agent, the tacky coating immediately becomes dry and nonsticky and the coated material may be wound up into rolls to be subsequently cut into labels. This type of heat-sealing adhesive is generally designated "delayed tack," because the adhesive, when reactivated by heat, does not set instantly on cooling as do ordinary heat-seal adhesives. Instead it remains sticky and usable for an indefinite, specifiable period.

The use of a hot-melt adhesive eliminates cost of a solvent or the necessity of drying.

2. Emulsion adhesives. Another

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[1] The Federal Adhesives–Brown-Bridge Mills process.

method of applying heat-seal adhesives is by means of emulsions or dispersions. These ordinarily consist of a water base containing a high percentage of fine particles of solid high-polymer thermoplastic resin. The most common resins are polyvinyl acetates, acrylics, polyamides and synthetic rubbers. Plasticizers, generally of the type which are crystalline solids at room temperature, may be added, as well as extenders, such as modified resins, phenolics, coumarone-indenes, which also act as tackifiers.

The emulsion or dispersion is applied to the base material by means of roller, doctor blade or any other standard type of coating machine and the coated stock is then dried. (See "Coating and Laminating Equipment," p. 526.)

By proper selection of the high-polymer resin, the formulation can be altered to give a wide range of heat-sealing temperatures. On a heat-sealed bag which requires paper failure when the bag is torn open, emulsion coatings are particularly effective, since penetration of the water vehicle produces a particularly good adhesion between the coating and the paper.

A combination emulsion-dispersion is used to produce delayed-tack, heat-seal labels by a special process.[2] The solid plasticizer and tackifier are ground in water to form dispersions, which are then mixed with a high-polymer emulsion.

3. Solvent solutions. These generally consist of plasticized cellulose esters and are applied with conventional lacquer coating equipment. Heat-seal coatings produced from such solutions are transparent and flexible and usually have excellent greaseproofness. Heat-sealing cellophane is a common solvent-solution-coated material.

The base material itself may also act as a heat sealant. Some packaging materials, such as vinyl, chlorinated rubber and polyethylene, are thermoplastic and, when subjected to heat and pressure, are fused together to form a strong bond. Bags of these materials may be made and also closed after filling by heat sealing. No adhesive is used, although in some cases a volatile solvent may be used to promote adhesion.

The heat sealability of an adhesive will depend upon the thermoplastic nature of the coating produced with it. Thicker films heat seal more readily than thin ones. Soft films will heat seal more easily than harder ones. A low reactivation temperature is desirable, but this causes a tendency for the coating to "block" or to become sticky during storage. Care must be taken that any heat-seal adhesive be carefully tested to make certain that the coating made with it does not soften later when exposed to high storage or handling temperatures.

The development of delayed-tack adhesive-coated labels has caused a marked expansion in labeling bottles by the "dry" or no-glue method. This permits fast automatic labeling.

[2] The Nashua Process.

Hot Melts*

The important quality of hot melts is liquefaction by heat followed by a firming of the melt as it cools to the original temperature. The thermoplasticity of this class of materials makes possible their use without the co-use of water or solvent and gives easy control of working consistency by temperature regulation, easy control of film thickness and adaptation to high-speed operations requiring very short setting time.

Laminates of paper, cellophane and cellulose derivatives, foils, plastic sheet, etc., are made using hot melts. Asphaltic formulations are extensively used in water-resistant laminated paper, fibre-reinforced papers and board stocks. Wax formulations are used to bond laminated paperboards, glassine laminates and other similar materials.

Coatings and surface finishes of paper, cloth, plastic sheet and foils are made with melts in several ways, such as direct transfer from a doctor applicator roll, by intaglio technique or by molten spray. A large number of manufactured products requiring special protection are coated by hot dip, which then is followed by draining and cooling.

The food-processing industry uses hot pickup gums and spot-labeling hot melts extensively. The hot pickup gum makes a short-lived bond between label and container until the label is fully wrapped. The spot-label adhesive picks the label from the label stack in the same way but must also make a permanent bond.

A variety of containers use melt adhesives for temporary as well as permanent bonds under flaps, spouts, lips, seams, joints, etc. Milk cartons, frozen-food and other packages can be partially or wholly formed with the aid of hot-melt adhesives.

Although hot melts require special equipment usually not needed for other adhesives, there is a steady trend towards their greater use as critical requirements develop. Unique advantages of hot-melt adhesives are high speed, total absence of volatile components, very quick set and ability to impart many unusual qualities, such as controlled flexibility, vermin-proofing, rust resistance, and exclusion of air, water, oil and other foreign materials.

* This article written by officials of The Adhesives Products, Inc., Albany, Calif.

What to Tell Your Adhesives Supplier

by Frank C. Campins*

Your adhesives supplier is entitled to know your "adhesion policy," or performance requirements, to guide him in working toward your goals.

For, actually, the packager purchases adhesion when he buys adhesives and, in the final analysis, he is concerned with cost of dependability and performance rather than cost of adhesives per pound.

Basic points on which to build an adhesion policy involve engineering requirements including considerations of (a) the product packaged, (b) the stocks used, (c) the mechanisms for application and for bonding, (d) historical conditions.

The product packaged. A major consideration is the possibility of contamination, for example, the picking up of odors, the effects of moisture and the possibility of toxicity.

The stocks used. Surface treatment or contamination, variation in stiffness, porosity, direction of grain are all important. Limitations thus imposed are best determined by testing actual representative samples that include the maximum variation. Which side receives glue, for instance, is one of the questions answered this way.

Mechanism. The mechanical questions to be answered include: What viscosity, flow properties, etc., are demanded for proper handling by the applicator? What are the "time ele-

* President, Polymer Industries, Inc., Springdale, Conn.



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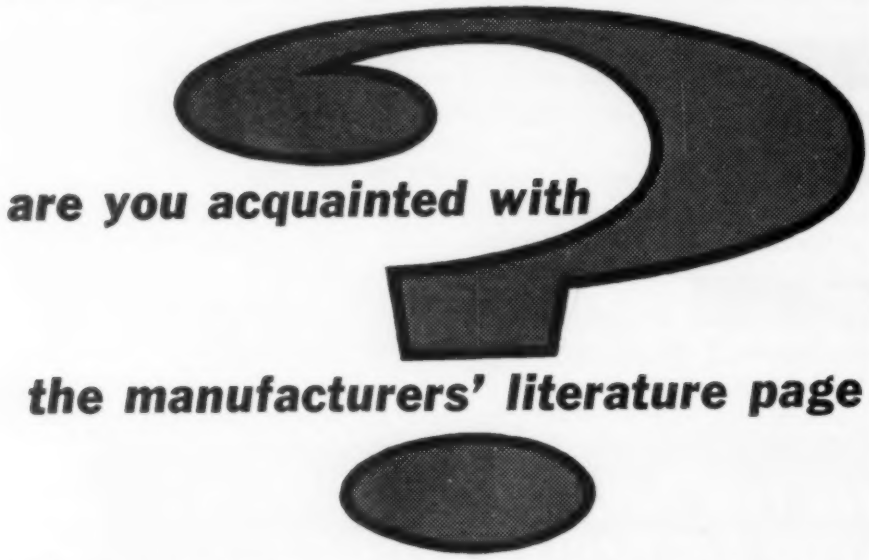
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ments" and the "mechanical responsibilities" expected from the adhesives?

Historical conditions. The materials to be bonded come to the job with a history. They have been exposed to varying conditions which become part of the adhesion problem. Similarly, variations in the operating conditions at the time of bonding and the conditions that will prevail during the useful life of the bond influence adhesive design. Hence, the historical conditions span a long period, of which the assembly or bonding time is but a brief middle period.

Now, all engineering tries to include a factor of safety which reflects the ability to perform under the worst conditions probable. For dependable results this means manipulation of all components of a job. Therefore, each step in the production of a product should include its factor of safety.

In this sense the adhesive supplier needs to know the scope of his job and this is never defined by one sample under one set of conditions.

Minimum cost of adhesion. Here is the major goal of any process, tieing in with salable units produced per day. Thus, any alteration in the adhesion process that may result in the lowering of the cost per unit produced merits prolonged study.

Accessory functions. Often the mere bonding requirement of an adhesive is secondary to some other desired property which dominates product function, such as flexibility and barrier action, and this needs to be made clear to the supplier. In practice, the accessory functions of adhesion are on the increase and having a great effect on design.

Increasing "quality insurance"

Every test procedure, every product or every policy that augments "quality insurance" is essentially a path to increased productivity and thus decreased cost of adhesion.

Many facets of this are involved in the engineering requirements, but it is important to recognize that policy alone has its impact on results. Thus a policy that favors a specific adhesive for each major pair of surfaces generally is preferable to one that demands a multipurpose adhesive to cover various films or surfaces.

In general, adhesion policy should never be static. A critical over-all review of policy is needed at least yearly. What to tell your supplier is a continuing and changing story.

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Summary of packaging adhesives—

TYPES AND PROPERTIES	USES
VEGETABLE ADHESIVES as a group are soluble in and miscible with water. Insoluble in organic solvents. Usually intended only for paper to paper, paper to glass and similar applications. Unless specially formulated will not stick to ink, varnish, resin-coated surfaces, etc.	
Pastes. Usually light colored. Some very short, buttery; break down on agitation; others gummy and maintain viscosity on agitation. Some semifluid, soft. Borated types quite fast setting. Starchy unplasticized pastes are slightly moisture resistant, high-humidity and sterilization resistant. Heavily plasticized pastes, good nonwarp qualities. Most are acid pH; few neutral; borated pastes are alkaline.	Bag bottoms, hand labeling, lap paste, mounting, laminating convolute tube winding, end sealing.
Jelly gums. Rubbery, cohesive, gummy. Some moisture resistance, good high-humidity and sterilization resistance. Referred to as "semi-iceproof." Excellent final adhesion and non-crystallizing characteristics. Many on alkaline side for better stability and adhesion on oily or greasy bottles. Few on acid side, for lighter color. Colors (white, amber, reddish brown, etc.) depend on composition and pH.	Limited by cohesiveness. High-solids types for fully or semi-automatic bottle labeling. Modified forms for foil-paper laminates. Lower solids for table gummers, hand operations.
Borated dextrins. Color range—white to dark brown. Most of them are fluid, filmy, comparatively fast-setting materials. Some special soft, short, buttery types are classified as pastes. Generally have fairly good high-humidity resistance and final adhesion —especially the less-converted types. Used at medium to thin consistency to avoid stringing or cottoning and to insure proper spreading characteristics. Alkaline pH.	Case, carton sealing; tube winding, tightwrapping, bag seams, lining, laminating, sizing, wrapping; folding boxes, stripping, lap paste; bag sealing, duplexing. Labeling.
Unborated dextrins. Color range—light yellow to dark brown. Brown is usual color. The unplasticized types are high solids, usually fluid, tacky, fast drying. Most of these can be spread in a thin film and applied by machine at a comparatively heavy consistency. Are valuable where high initial tack and fast drying are necessary. Usually on acid side (normal dextrin pH) unless adjusted for some special need. Some modifications for the envelope trade have moderately good noncurl properties. Types for back seams and glassine windows are slow drying, have good lay flat adhesion.	Envelopes, Brightwood and stencil gums. Carton sealing, lacing, bottle labeling, remoistening adhesive on gummed labels and stamps. Cold pick-up gum for can labeling.
Gum arabic. Light color, tacky, fast drying. Less sensitive to humidity block than most unborated canary dextrins. Not so short as most dextrin products on stencil and transfer operations. Are on the acid side.	Some wrapping and stencil operations. "Tropical front seal" for envelopes (to resist blocking).
ANIMAL GLUE ADHESIVES are soluble in and miscible with water. Insoluble in organic solvents. Dried films exhibit good strength. Good adhesion on difficult paper stocks (no ink, varnish, etc.). Normal pH slightly acid.	
Nonwarps. Usually supplied in an 8- or 10-lb. cake or slab. Used at 140 deg. F. Good lay flat properties. Dried film not necessarily flexible. Good tack. Drying range, setting speed are adjusted in formulation. Long tack range products called bench or table glues. Most are light in color, have strong, "chewing gum" tack.	Set-up box tightwrapping and stripping. Covering glue in luggage trade. Lay flat mounting and laminating.
Flexibles. Physical appearance similar to nonwarps. Used at 140 deg. F. Formulated with plasticizers which give flexibility to dried film. Flexible glues usually also nonwarp. Permanent moisture retention gives high degree of grease resistance. Available in fast- or slow-setting grades for machine or hand operations.	Applications in box and luggage trades where flexibility and pliability are required. Greaseproof coatings. Padding.
Glue jellies. Essentially animal glue pre-dissolved and preserved for the convenience of the user. Solid jelly at 70 deg. F. or below. Liquefies quickly as temperature is raised. Supplied in drums of 5- to 55-gal. size. Usually neither flexible nor lay flat.	Primarily on some machines for setting up shoe boxes.
Liquefied animal glues. Fluid at room temperature. Color may vary from light tan to dark brown. Properties vary widely depending on end use. Iceproof gums are formulated to jell in cold water and hold labels on bottles. Others are formulated for use as remoistening gum. Some string and cotton. Types intended for machine application are shortened to prevent this.	Iceproof gum for beverage bottles. Remoistening adhesive for specialty gummers. Wood gluing. Manifolding or collating. Make-ready adhesive in folding-box plants.

• Prepared by William W. Sederlund, Manager, Technical Service, National Adhesives Div., National Starch Products, Inc., New York.

types, properties and uses

TYPES AND PROPERTIES	USES
CASEIN ADHESIVES	
Casein. Moderate to high water resistance. Many cannot be thinned with water but require ammonia or alcohol as diluents. Dried films usually soluble in alkaline solutions. Fairly light color. Dried films strong and continuous. Usually better for adhesion to plastic, inked, lacquered, varnished, etc., surfaces than vegetable or animal glues. Usually alkaline pH.	Iceproof glue for beer, soft-drink bottling; case sealing; tin labeling, strip stamping; labeling over ink, varnish.
RESIN ADHESIVES	
Emulsions. Most based on polyvinyl acetate. White or light-colored, opaque liquids. Fluid or pasty. Acid pH. May contain solvents. Most give strong, continuous dried films. Water-resistant types may give fairly hard, stiff films. Those formulated for adhesion to foil or plastic films, cellophane, etc., and for padding give soft, flexible films. Many give thermoplastic films. Outstanding for final adhesion, fast setting, light color, humidity, grease and mold resistance, etc. Thinned with water. Highly water-resistant films may require solvents (acetone, acetone-water) for removal. Few used for fast set are made with comparatively poor water resistance for easy cleaning.	Case and carton sealing, tube winding, paper cups, milk containers, envelopes, folding boxes, trays, greaseproof coatings, heat-seal coatings, cellophane and acetate windows, cellophane bags, padding, paper-bag seams, bag sealing, bar wrapping.
Latex adhesives. Based on natural or synthetic rubber latex. Some based on reclaimed rubber dispersions. White to black opaque liquids depending on base and formulation. Usually alkaline. Some have ammonia odor in liquid state; others, characteristic odor of base synthetic latex. Most give flexible and pliable films. Some permanently tacky; others have self-seal property. Permanent strength and adhesion of those based on synthetic latices better than those based on natural rubber latex. Should avoid copper (brass, bronze, etc.) in glue pots, with natural rubber latex, for small amounts of copper accelerate oxidation and degradation of film. Adhere to a variety of surfaces, such as ink, varnish, lacquer, foil, plastics. Thinned with water. Dried films usually very water resistant and may require naphtha, etc., for cleaning.	Foil-to-paper lamination, Pliofilm and polyethylene bags, labels to inked and varnished surfaces, case-liner fabrication and sealing, water-resistant drum and container labeling, self-sealing bag and container closures, bag adhesives for wet waxed surfaces, padding.
Lacquers. Term lacquer is loosely used to describe an adhesive which contains organic solvents rather than water as the vehicle or solvent for the resin solids. Water-white to dark brown. Based on nitrocellulose, polyvinyl acetate, synthetic rubber, etc. Setting and drying speeds depend on types of organic solvents used. Most are free-flowing liquids. Some dry to hard, tack-free films. Others—used on cellophane, cellulose acetate, vinyl, polyester film, etc.—retain a soft, tacky, flexible film. Not water miscible. Organic solvents used for thinning and cleaning. Are not required or recommended for adhering plain paper surfaces together. Most lacquers flammable.	Cellophane bags, window cartons, waterproof labeling and overcoating, heat-seal and greaseproof coatings, plastic-film laminations, gloss coatings, rubber to metal, metal to metal. Used mostly on cellophane-bag machines, hand jobs and laminating machines.
Solvent activators. No resin content. Included with resins because of end use. Consist of solvent-plasticizer combinations that dissolve or fuse plastic films and make them adhere. Sometimes used with heat sealing to improve the bond strength. Usually light-colored, clear, water-thin liquids. No diluting nor cleaning required. Many volatile types flammable.	Wrapping and heat-sealed bag operations involving plastic films.
Hot melts. Solid or semi-solid combinations of film former, tackifying resins, plasticizers, waxes, etc. Contain no water or organic solvents and may be considered as 100% solids. Must be heated to liquefy for use. White to dark brown depending on composition. If based on wax or crystalline resins, liquefy over a comparatively narrow temperature range but usually lack toughness and adhesion at low and high temperature. Those based on high-molecular-weight resins are harder to use because they have no well-defined melting point and require higher operating temperature; give better toughness, adhesion and flexibility at high and low temperatures. Hot pickups for can labeling are formulated primarily for instantaneous high tack—not final adhesion. Some hot melts used in laminating and coating for faster operating speeds and more compact equipment. Require no drying tunnel.	Laminating, coating, heat-seal coating, laminant in barrier papers, can labeling, splicing, tear-tape application, strip coat for metal parts, milk-container manufacture, tube winding.
Extended resins. Resin emulsions and aqueous solutions of resins plus starches, inert fillers, etc. Provide some advantages of resin adhesives (water resistance, final adhesion and grease resistance) at lower cost. Do not adhere cellophane, plastic films, foil, etc. Usually slower setting, less flexible than straight resin adhesives. Light-colored, opaque materials. May be fluid or pasty. Water used for diluting and, in most cases, for cleanup. Usually acid pH. Few neutral or slightly alkaline.	Case sealing, carton sealing, tube winding, milk-container manufacturing and sealing, folding cartons, bottle carriers, paper cups, bag seams and bottoms, pre-coat for printing, laminating, mounting, straw winding.

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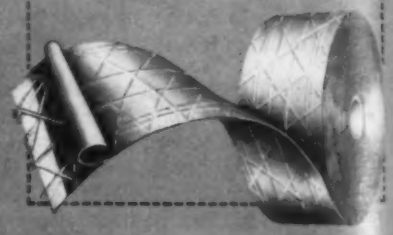
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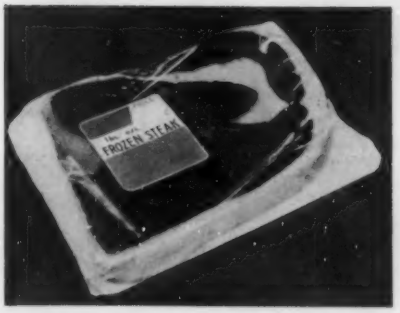
New Laminations

by Bernard Gould*

Laminated materials continually offer packagers new opportunities to devise and produce better packages. This has been increasingly true in recent years because of the advent of a number of important packaging films. These films have made their mark in packaging in the form of unsupported webs, but additionally it has been found that their usefulness could be greatly extended by combining them with other materials. Now other materials are appearing on the market, and an important question is: What will be their future in packaging?

New adhesive formulations, introduced in recent months will, it is claimed, make it possible to mass-produce many new packaging materials that show exceptional promise.

Outstanding among these is the group of adhesive formulations which now make it possible to laminate "Mylar" to polyethylene efficiently. The "marriage" of this new polyester



Mylar-to-polyethylene combination

film with polyethylene appears to provide the answers to several of the problems which have plagued packaging designers for many years. It already appears to be a promising material for use in the vacuum-packaging field and by other users of laminations.

As compared with the popular cellophane-polyethylene packaging lamination, "Mylar," as the alternate laminate, offers higher strength and considerably increased folding endurance. In addition, as an extremely rugged, uncoated film, it can be utilized in production in considerably finer gauges than previously known laminates, while at the same time vastly restricting the gas-transmission rate of the finished assembly—a factor of extreme importance in many packaging specifications.

Similar interesting combinations now made possible through advanced adhesive chemistry are arousing widespread interest. These include: Mylar to saran; Mylar to vinyl; Mylar and aluminum foil to new types of paper board, etc.

Another unique adhesive now permits lamination of Teflon film to resilient backing materials such as paper, cork, etc., for use as bottle-cap liners.

Since the bonds which have been achieved were created to withstand sterilization, this represents a development of extreme importance to pharmaceutical companies and similar specialized cap-liner users.

The availability of such completely new, specifically formulated adhesives will undoubtedly permit more widespread evaluation of these new packaging products and will clear the way for extensive expansion of acceptance which is bound to arise as these new combinations become more easily workable, more readily available, and more economical for packagers.

* Sales Promotion Manager, Rubber and Asbestos Corp., Bloomfield, N. J.

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Tapes used in packaging

by L. M. BERLIN*

PHOTO COURTESY MINNESOTA MINING & MFG. CO.



Tapes provide an efficient, inexpensive solution to knotty bundling problems for special offers and bonus deals.

PHOTO COURTESY PERMACEL TAPE CORP.



Moistureproof seal is provided fibreboard containers for precision motors by rubber-resin-impregnated paper tapes.

PHOTO COURTESY HUDSON PULP & PAPER CORP.



Imprinted tapes add a custom touch in addition to providing tough closure to packages for delicate cameras.

The three important volume uses of tapes in packaging are *sealing*, *reinforcing* and *banding*, but other important functions include coding, identity marking, protection, holding.

Because of their versatility and their potential for effecting economies when properly used, tapes are finding new uses each year.

There is a definite trend toward more automatic tape applications for more over-all efficiency in the packaging field. For example, one new type of machine applies a patch of pressure-sensitive tape over preopened apertures in a can of cleansing powder. Similar new machines are enabling tapes to take over an increasing variety of chores in packaging.

Gummed tape

Standard gummed tapes consist of a kraft paper backing and water-activated animal or vegetable glue or a dextrin adhesive. Normally brown, these tapes may be had in a wide variety of colors and may be printed. They are available in paper having ream weights of 35, 60, 90, 100 and 160 pounds. They are usually sold in widths that fit the sealing-tape machines which apply water.

Stay paper. Kraft of 90-, 100- and 120-lb. weights is coated with a special high-test glue. The resulting tape is applied over stitches and is used to reinforce corners of lightweight boxes.

Reinforced kraft. A variety of reinforced gummed tapes are available. The reinforcing agent is embedded in the asphalt or rubber-base layer between two layers of kraft paper in one or both directions.

Corrugated cambric. This is essentially a gummed cloth tape and many have the cloth clay filled or laminated to a kraft paper. Used for the manufacturer's joint, cambrics come in various weights.

Waterproof sealing tape. Asphalt-laminated kraft paper is treated with an adhesive that "sets up" after activation with a special solvent.

Pressure-sensitive tape

Adhesive tapes which adhere readily to almost any surface without heat or solvent preparation are known

* Industrial Marketing Mgr., Tape Div., Minnesota Mining & Mfg. Co., St. Paul, Minn.

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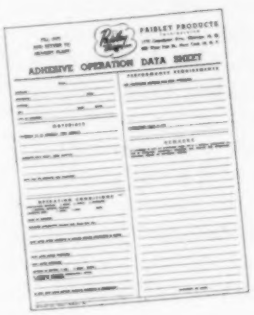
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as pressure-sensitive tapes. They stick immediately upon contact. The adhesive is a constantly tacky, rubber-like material. A wide variety of adhesive properties is available, but types used in packaging show a high degree of specific adhesion to treated and untreated papers, films, foils and other metal, and plastics.

One advantage of a pressure-sensitive adhesive is that it is made to order for automatic application. The machine may be shut down for any period of time and then started up without any preparation.

Pressure-sensitive tapes have been approved by Railway Express, the U. S. Post Office and the Freight Classification Committee, whose regulations may be consulted.

Wide variations are available in the backing material of pressure-sensitive tapes that make it possible to package anything weighing from 1 oz. to 800 lbs.

Cellophane is the most widely used backing for pressure-sensitive tape. It is coated with transparent or colored adhesives and may be roll printed in as many as four additional colors. Cellophane tape is used to seal folding, telescope and other set-up boxes. It is also used to seal cellophane and treated and untreated paper bags; to seal pre-packaged meat and produce wraps; as a label when printed, and to seal cans such as popcorn and potato-chip containers. Ease of manual or automatic application and ability to adhere to a wide variety of surfaces make this tape ideal for attaching articles together in combination and

PHOTO COURTESY NASHUA CORP.



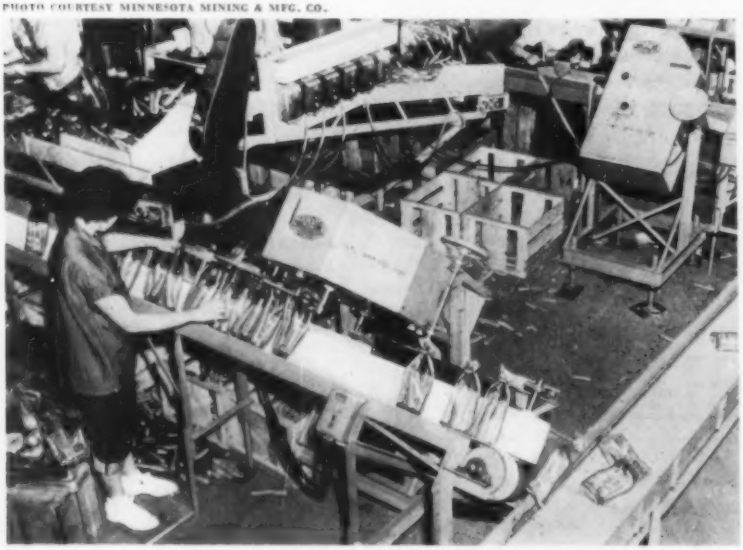
Flexibility feature of gummed tape as to size and shape of packages is augmented by merchandising potentials.

premium packaging. Printed cellophane tape is also used to make corrections on printed wrappers and lithographed cans.

Cellophane tape is used to hold various types of containers to display cards. The tape and article can be applied to display cards automatically in a staplelike application, thus preventing possible pilferage.

Acetate fibre. A combination of a saturated, long-fibre paper and a cellulose-acetate film makes one of the best moistureproof tapes available. Water-vapor transmission rates as low as 1 gm. per 24 hr. per 100 sq. in. are available. The tape is used to seal moistureproof paper wraps and V-board boxes. It is also used to seal cans that require better protection than that afforded by cellophane tape, such as tobacco cans and some potato-chip and popcorn cans. Special constructions are available for taping waxed cartons and specially treated papers like those used in the meat industry. Many acetate-fibre tapes can be roll printed.

PHOTO COURTESY MINNESOTA MINING & MFG. CO.



Film bags of carrots are closed with paper-backed pressure-sensitive tape. New machine handles 120 2-lb. bags per minute.

This type of tape may be used to close film bags in which produce is packaged. Various colors of tape can be used for eye appeal and also identification. Equipment has been designed to apply such closures automatically. Acetate-fibre tapes meet Types III and IV of military packaging specification JAN-P-127.

Unified paper tapes. Three types are manufactured: 30-lb. creped sulphite, 30-lb. rope stock and a 60-lb. kraft. They are highly water resistant.

Creped tapes were originally made for paint masking but have found wide use in bundling parts and in recoopering shipping containers at freight depots. In an assembly application, screws are placed half an inch apart, crosswise between the tape and a strip of kraft paper. Placement is done automatically and produces a strip allowing automatic dispensing of a given number of screws for hardware assemblies.

Attractive contrasting colored, paper-backed, pressure-sensitive tape is now being used to hold pre-packaged fruit in trays.

Recently packagers have employed creped tape to band two metal cans together to form a deal. Semi-automatic equipment applies the tape around the cans, joining them together securely at their flanges. This type of packaging offers packagers important new opportunities, in promoting, merchandising and sampling canned products.

Rope-stock paper tape has a high tensile strength but is chiefly known for its tear resistance. As a result, it is used to reinforce the corners of set-up and folding boxes. It is also widely used in recooperage because it sticks well to scuffed or dirty surfaces of shipping cartons.

Waterproof kraft tape is designed primarily for carton sealing. It is believed to cut application time as much as 35% and upgrades the water resistance of domestic corrugated boxes, according to the manufacturer. Automatic equipment is available that will apply this tape over the lengthwise seam of a container.

This type of tape is used to seal W-board containers in military packaging and is covered by Federal specification PPP-T-0076.

Plastic film tape. Vinyl-backed tapes, with their high conformability, are receiving wide acceptance as a means of securing screw-cap closures. These tapes are used on a wide va-

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Important news for policy-making executives—

A Market Research Organization that Specializes in Plastics!

Top management men will recognize at once how this new organization can help them to chart profitable new areas of operations in the fast-moving, fast-growing plastics field.

Background Facts. More and more companies are investigating plastics with an eye to developing new product lines, new sales outlets, new and promising openings for capital investment. The reasons make sense: plastics are a still new and constantly growing family of basic manufacturing materials, that are tied to many growth industries with a host of vital product applications.

Nevertheless, the prudent executive charged with the shaping of company policy does not proceed rashly. He knows that the plastics field is complex. To steer his company on a knowledgeable course calls for informed and highly *specialized* research by experts who *know* the plastics field. *Modern Plastics Research Corporation provides just this kind of service. . .*

What the Company Is. The firm is unique in the field of business research. Its expertness in the field of plastics is unmatched. The staff is composed of specialists in all facets of the subject: present and potential applications, trends and developments in materials and technology, marketing and merchandising, financing and administration.

Moreover—and most significantly—*the firm is directly affiliated with Modern Plastics magazine, the country's largest and most authoritative publication serving the plastics field.* It has full recourse to the accumulated experience, background and knowledge of that publication.

How to Use Its Services. If you are currently looking for a fresh approach to your own program of company expansion—or if you feel the need for thoroughly researched facts concerning your current operations—then you should arrange *now* for a preliminary consultation with a principal of this company.

Such a meeting places you under *no obligation*—yet enables you to estimate *in advance* the value that a full analysis can bring to your company.

All communications and inquiries held in strictest confidence.

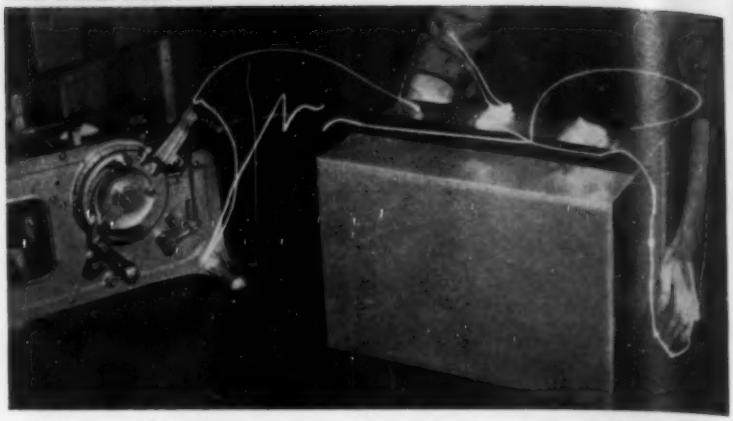
MODERN PLASTICS RESEARCH CORPORATION
575 Madison Avenue New York 22

riety of can closures to obtain the best possible moisture seal and this application has received special emphasis by companies supplying aircraft and other engine parts to the armed forces. They are now covered by military specification MIL-T-4329.

Cloth tapes. Tapes with coated and uncoated cloth backings are employed in sealing cartons and in bundling light articles. Coated cloth tape is used with acetate-fibre tape to seal water-resistant wraps and cartons. It is covered by Types I and II of JAN-P-127. It is also used to protect fabricated metal products from scratches in shipment.

Filament reinforced tape. Strong tensile strength and extremely strong tear resistance are obtained by embedding thousands of filaments in the tape material. Reinforced tapes are available in pressure-sensitive or gummed types of tape—each serving different needs. The pressure-sensitive tape is characterized by its ease in application and removal on a wide variety of surfaces. Gummed tapes are generally used when it is desirable that the adhesive penetrate into the fibre of a paper or paperboard container to give a semipermanent seal.

PHOTO COURTESY ANCHOR CORP.



Motion study shows ease and speed of carton sealing with two strips of fibre-reinforced tape. The time required is 11 sec. flat.

The principal reinforcement fibres are glass and rayon filaments. Both types of reinforcement are excellent and selection of glass-fibre or rayon-reinforced tape is generally determined on a basis of individual requirements involving the degree of strength, stretchability and similar properties needed to provide performance at an economical cost. Tensile strengths are available ranging from 75 lb. per inch of width up to 500 lb. The 160- to 240-lb. test tapes seem to be in greatest demand.

Reinforced tapes are used for a wide variety of packaging chores—such as banding rolls of metal sheeting or heavy coiled items; bundling of loose or awkward items like hoes or shovels; bundling of newspapers for shock-resistant air drop delivery; unitizing of palletized loads; reinforcement or repair of shipping cartons, and sealing and closure of containers. Reinforced tapes are covered by Federal specification PPP-T-97 and Mil-T-4522 (USAF).

PHOTO COURTESY MINNESOTA MINING & MFG. CO.



Pressure-sensitive, creped-paper tape bands cans together in special deal.

Gummed Tapes for Sealing Shipping Containers

Important among the developments regarding tapes used in packaging has been the continuing growth in the use of reinforced gummed tapes. Among gummed tapes the principal reinforcement strands are made of glass, rayon or sisal filaments. Reinforced gummed tapes are used on center-seam closures of corrugated cartons and for sealing telescopic boxes, unitized loads and packages. They are used, in fact, to seal any type of paper or paperboard container.

Early in 1955, Uniform Freight Classification Rule 41 was amended to approve use of single strips of reinforced tape in sealing the tops and bottoms of slotted and double-wall boxes. According to the regulation, the tape must be at least 3 in. wide and extend 2½ in. over the ends.

The plies must be 100% sulphite kraft, each of which must be at least 30 lb. basis weight, combined by a laminant that will withstand a safe range of temperature extremes. The lengthwise reinforcements must be spaced not more than an average ½ in. apart and crosswise reinforcements not less than an average of two per inch. Glass, rayon or sisal reinforcement may be used provided that minimum tensiles of 75 lb. (per inch of width) machine direction and 45 lb. cross direction are obtained.

The reinforcement strands are embedded in the tape between the two plies of kraft in a great variety of lengthwise, crosswise, diagonal and random patterns. The strongest tapes are produced with grid or similar patterns that reinforce both lengthwise and crosswise. Balanced patterns of equal-spaced strands are desirable so that tensile strength will be uniform throughout the length and breadth of the tape.

As a result of the new amendment to Rule 41, two strips of reinforced tape thus can be used to do the job that required six strips of regular gummed tape. The two strips of reinforced tape, reportedly, can be applied in about 11 sec. as compared with 38 sec. required for six-strip application. Labor-cost savings of from 60 to 80% are reported, but even more significant is the fact that the simpler two-strip method lends itself to application by automatic machine.



A water-resistant barrier safeguards its famous foaming action

AJAX is the *foaming cleanser*. This foaming action cuts grease fast; other ingredients then leave a bright polish on porcelain, glass, metal, linoleum and many other surfaces. In short, Ajax polishes as it cleans.

This performance is the result of both physical and chemical action by and in the product. To insure this performance, Ajax is delivered in perfect condition—to the user. The outside canister lining produces a water-resistant barrier protecting the contents.

The Ajax canister is a fine example of special design, modern packaging methods and machinery, and top quality adhesives. We are proud of the fact that Arabol Adhesives were specified for this difficult assignment.

Arabol is proud to serve Colgate-Palmolive Company at their well-known Jersey City plant. We are similarly privileged to serve the leaders in a hundred industries—with specification adhesives for a thousand end uses.

Somewhere in your business you use adhesives. Somewhere near your place of business there is one of Arabol's twelve plants and warehouses ready to serve you.

We invite the opportunity to submit samples for you to test in your own plant —under your particular working conditions —for your specific requirements, whatever their nature. That is the one kind of testing that assures you of satisfactory results. Your inquiry to Department 32 will bring a prompt response.

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THE **ARABOL** MFG. CO.

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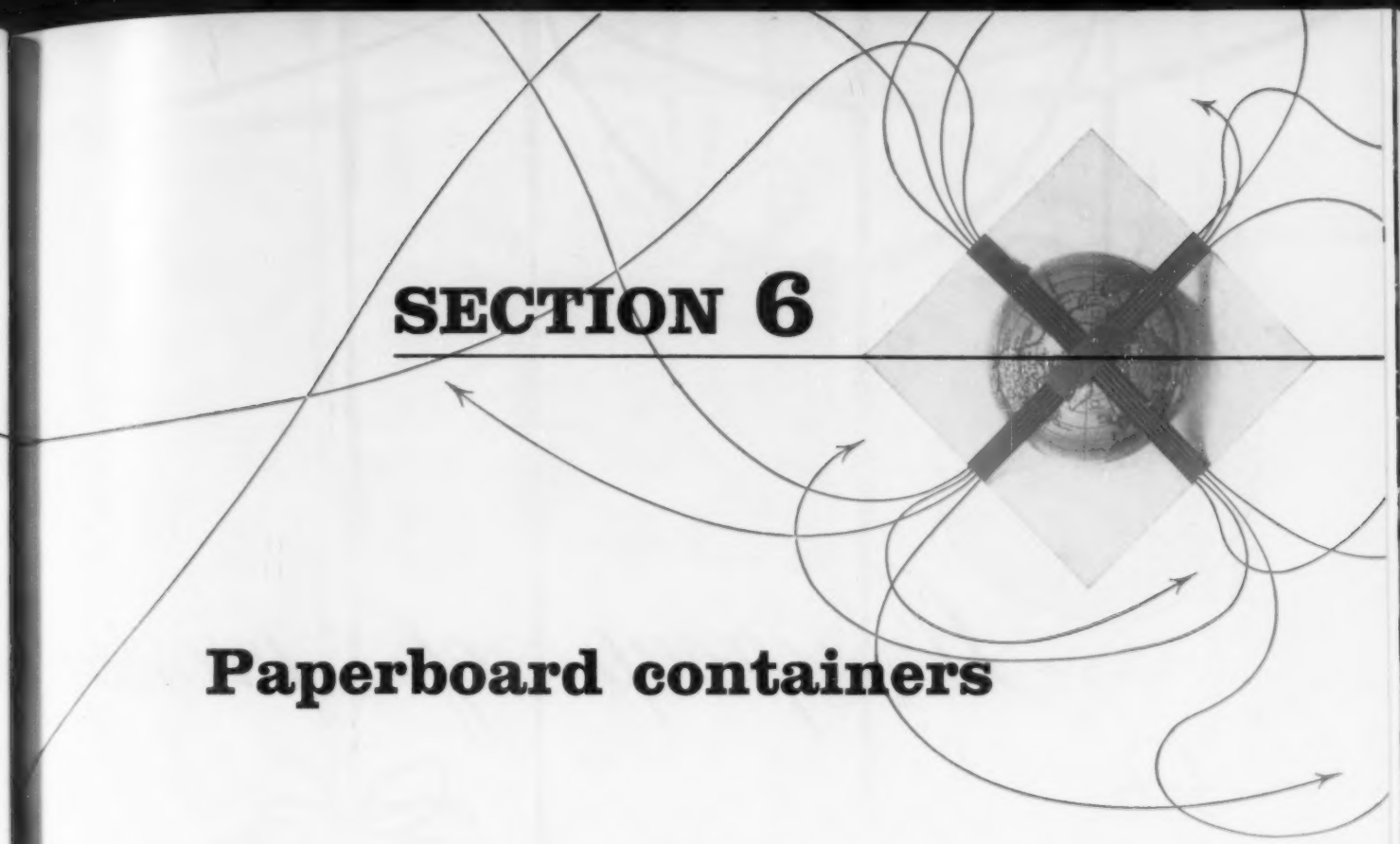
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POND'S
A group of prestige
Pamper
GOLDEN LIQUID
shampoo
"Gentle As a Lamb"
HAZEL BISHOP
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LIPSTICK • COMPACT MAKE-UP • COMPLEXION GLOW

roducts packaged by Burt







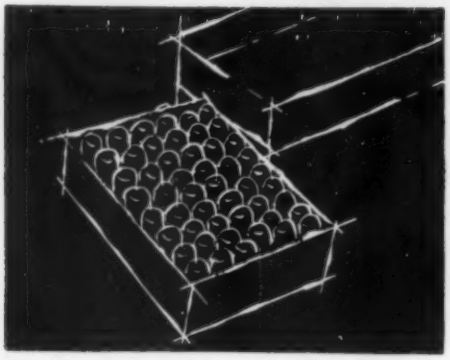


Flying high and handsome, this group of prestige products shows the artistry and good taste found in all packages by Burt.

When you need an eye-catching set-up box, folding carton or transparent container, select the finest in prestige packaging ... select Burt.

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Canadian division: Dominion Paper Co. Ltd.
469-483 King St. W., Toronto, Canada

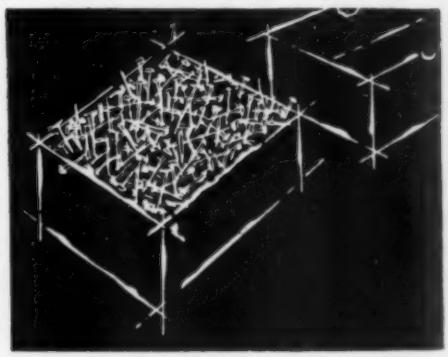
For gum drops or nose drops...





For fingernails or door nails...





MILLER BOXES lead in protection and promotion!

Whatever the nature of your product . . if it can be packed in a paper box, you can count on Miller to build the best box for the job. And you can look to Miller for practical, workmanlike suggestions that will help both protect your product and promote its sale.

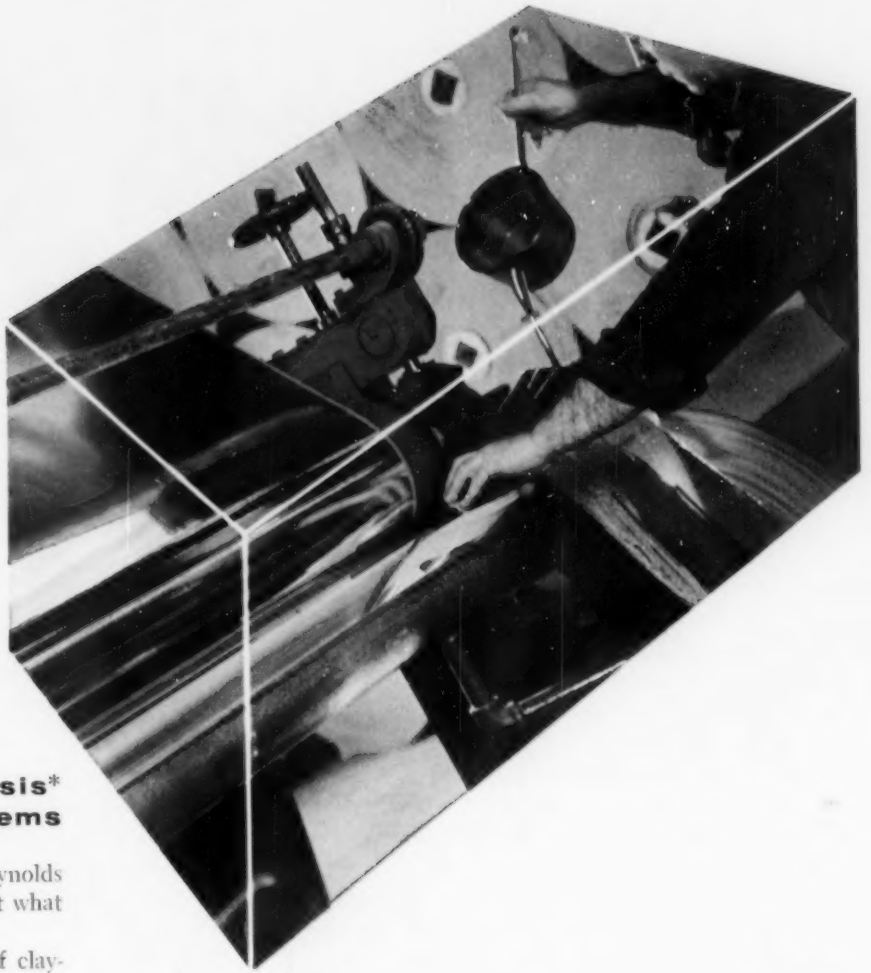
Packaging awards, as well as day-to-day experience, attest Miller's know-how in box construction. For example: in the 5-year history of National Competition for set-up paper boxes, Miller-made boxes have won the most awards in the pharmaceutical field.

This skill is waiting for you to use. Write or call

Walter P. Miller Company, Inc.

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Maybe your carton needs this "Midas touch"



How Gair Package Analysis* diagnoses cartoning problems

Maybe the "Midas touch" of Gair-Reynolds exclusive gold foil-laminated board is just what the doctor ordered for your carton.

Or maybe not! The white crispness of clay-coated stock . . . the transparency of Plastafol . . . the extra protection of another Gair carton material might sell your product faster.

Point is, Gair Package Analysis gets rid of the "maybe". This unique service uncovers your basic packaging needs, relates them to your marketing and shipping patterns. Then Gair Creative Engineering studies these facts, comes up with the carton material, the structural and graphic designs, the printing and production techniques that will make your carton a best-seller in today's fast-moving market.

• • •

Gair Package Analysis is a service designed to blueprint a successful carton for your product. Your nearest Gair representative will be glad to give you the full story. No obligation, naturally.



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Creative Engineering in Packaging

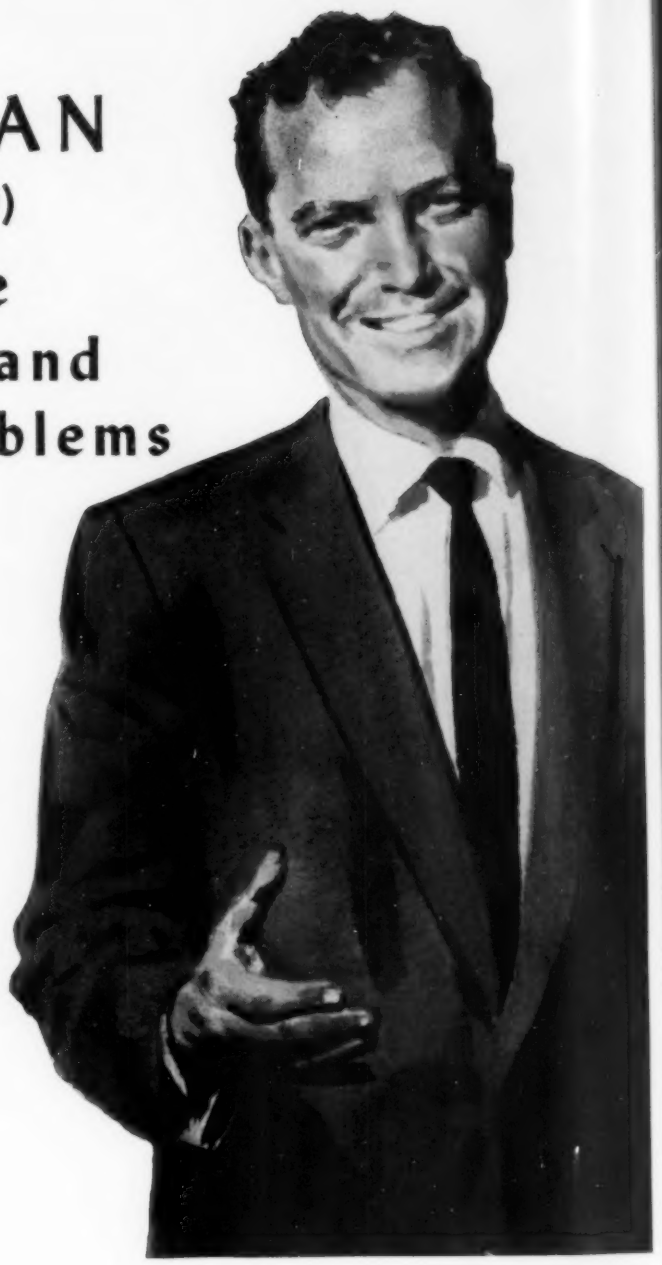
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155 EAST 44TH STREET • NEW YORK 17, N.Y.

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SHIPPING CONTAINERS • PAPERBOARD

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(the Man from Marathon)

who can solve your packaging and merchandising problems



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He knows all phases of package design and development . . . knows retail merchandising through shopper motivation studies and personal in-store interviews. In short, he knows how to push package sales.

Behind him is a full-time research and development staff contributing scientific knowledge to the production, protection and selling of your package.

The Man from Marathon can be a profitable addition to your organization . . . without adding a penny to your payroll. Why not give him a call?

Your Man from Marathon can be reached here

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HOWELL of ELMIRA

Our boy "HOWIE," a young feller (with over 70 years' experience)—is eager to go to work on *your* packaging problems! Why not now?

Designers and Manufacturers of . . .

LABELS • BANDS • WRAPS • FOLDING BOXES • SET-UP BOXES • ADVERTISING DISPLAYS

F. M. HOWELL & CO., ELMIRA, NEW YORK



IS THE WORLD PASSING YOU BY?

THE U.S. Department of Commerce recently listed the eight most common causes of marketing failures. Leading the list were failure to find out what buyers want in the way of packaging and failure to gear products to present day demand. *How can you overcome these faults in your packaging? The answer is simple!*

Let UNITED'S experienced packaging experts do the job for you. They have devoted many years to solving the same problems that are holding your products back. Their extensive experience in design and production of folding cartons from paperboard and laminated foils manufactured in UNITED mills is your guarantee that they will find the answer to your packaging problems. Don't sit back and watch the world go by. A telephone call to UNITED today can bring you increased sales tomorrow.

Call MUrray Hill 3-2570.

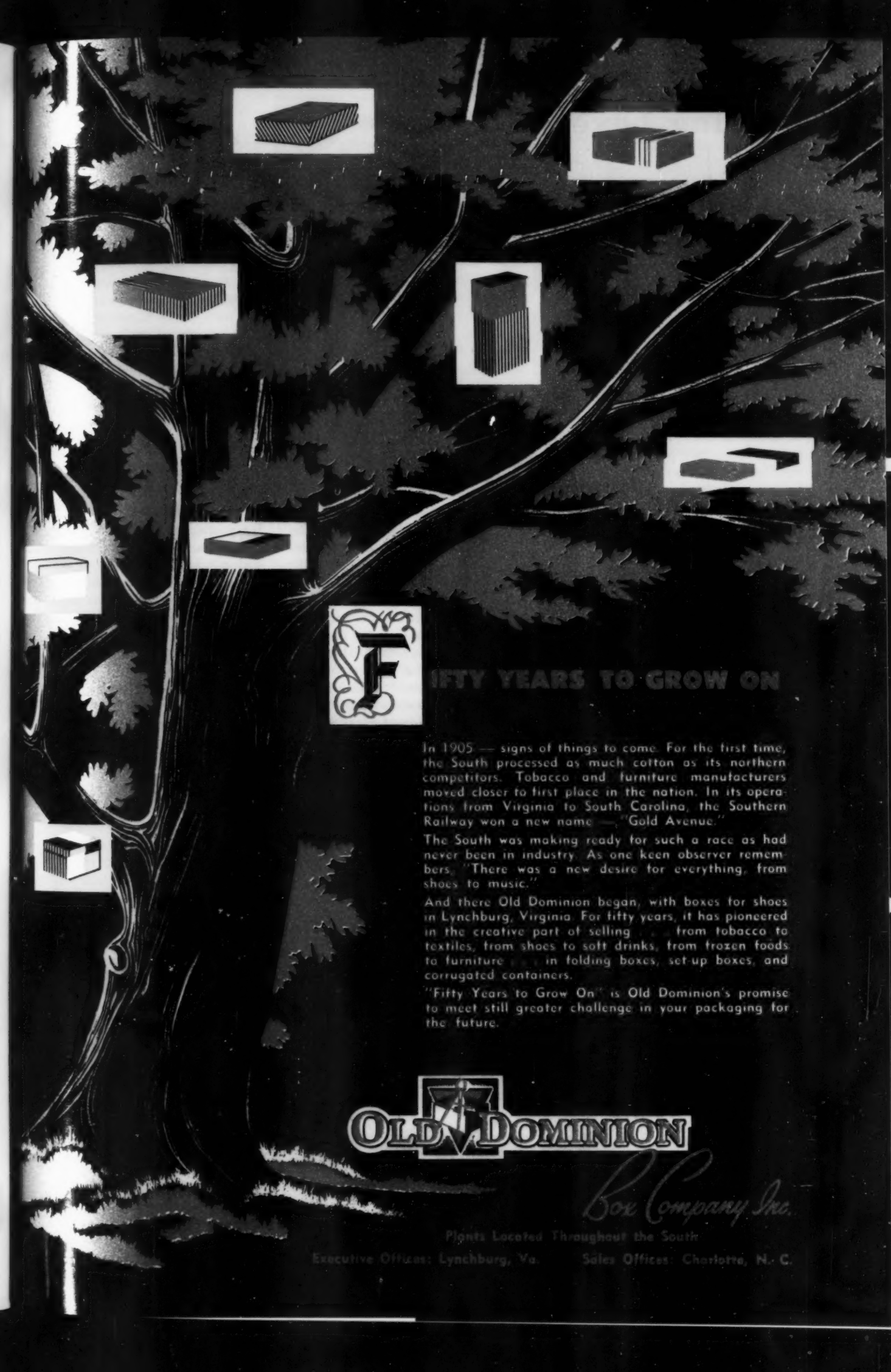




Typifying UNITED craftsmanship are these 1955 Folding Carton Association prize winners.

UNITED BOARD & CARTON CORPORATION

TWO PARK AVENUE · NEW YORK 16, N. Y.



FIFTY YEARS TO GROW ON

In 1905 — signs of things to come. For the first time, the South processed as much cotton as its northern competitors. Tobacco and furniture manufacturers moved closer to first place in the nation. In its operations from Virginia to South Carolina, the Southern Railway won a new name — "Gold Avenue."

The South was making ready for such a race as had never been in industry. As one keen observer remembers, "There was a new desire for everything, from shoes to music."

And there Old Dominion began, with boxes for shoes in Lynchburg, Virginia. For fifty years, it has pioneered in the creative part of selling . . . from tobacco to textiles, from shoes to soft drinks, from frozen foods to furniture . . . in folding boxes, set-up boxes, and corrugated containers.

"Fifty Years to Grow On" is Old Dominion's promise to meet still greater challenge in your packaging for the future.

OLD DOMINION

Box Company Inc.

Plants Located Throughout the South

Executive Offices: Lynchburg, Va. Sales Offices: Charlotte, N. C.

Folding boxes

by WILLARD F. DEVENEAU*

The folding box is capable of being made in an endless variety of sizes and shapes, of many combinations of different materials, printed in all colors of the rainbow and usefully fulfilling the packaging needs of thousands of products as varied in kind, size, shape and weight as are human needs themselves.

The folding box has developed to the point where it is probably the largest and most widely used form of packaging. The industry now has in excess of 500 individual folding-box manufacturing plants, many with their own paperboard mills, in which have been invested well over 100 million dollars, and which give gainful year-round employment to better than 50 thousand men and women.

Folding boxes have long since proved their value as protective containers in the distribution of all kinds of consumer products. In the present self-service age, they have new importance as silent but effective salesmen for the products they contain.

With its large areas and excellent printing surfaces the folding box is well equipped to perform this selling job—providing product visibility through a transparent plastic window, realistically illustrating the product and its uses, giving directions how to use it correctly and, by showing its major advantages, pleasantly influencing the consumer to buy it on sight.

The manufacture of folding paperboard or boxboard is too technical a subject to be described in detail in this article. However, a brief explanation of its makeup, principal kinds and special treatments will prove helpful to a general understanding of this basic material from which folding boxes are made.

* Sales Promotion Manager, National Folding Box Co., Inc., New Haven, Conn.

Types of paperboards

Since folding boxboards are made for the express purpose of fashioning into boxes, the chief qualities sought are: (1) Strength enough to protect adequately the product packaged; (2) an ability to bend up to an angle of 180 degrees without breaking or cracking; (3) good appearance; (4) a smooth printing surface, on which single-color or multicolor designs and illustrations may be attractively reproduced.

An examination of a cross section of folding boxboard will show that the thinner surface layers are different from its center and that it is made up of three distinct sections. These are known as: (1) The *top liner* which is the outside printed surface of the box; (2) the *bottom liner* which serves as the inside of the box; (3) the *filler* which furnishes the necessary bulk to the boxboard and is normally several times as thick as the liners. Because the top liner becomes the section of the box constantly exposed to view, it is usually made of the finest and whitest materials. Inasmuch as the bottom liner is seen to a much lesser degree and the filler is not visible, there is no advantage to be gained by using the same high-quality pulps as in the top liner. In fact, to do so would add considerably to the cost of the boxboard without giving any material advantage. Consequently, more economical materials are used for these two sections. This does not lessen their serviceability but does reduce the cost of the boxboard, which is one important reason for the popularity of folding boxes.

A very wide variety of folding boxboards may be made by varying the raw materials and coloring matter used in the liners and fillers as well as by the application of white or colored surface coatings.

An exception is the boxboard used for packaging certain foods, notably ice cream, butter, shortenings, milk and quick-frozen fruits, vegetables, fish, poultry and meats. For these purposes both liners and fillers are made of the finest quality pulps, the resulting boxboard being homogeneous in cross section.

The standard measurement for indicating boxboard thickness is known as a "point," which is one-thousandth of an inch. The majority of folding boxboards in common use measure between 16 and 40 points in thickness, written as 0.016 and 0.040.

For the purposes of this article a description will be given of the five principal kinds of folding boxboard. (See also the chart, "Paperboard—Types, Characteristics and Uses," p. 56.)

Bending chipboard. This is the lowest grade of folding boxboard and

PHOTO COURTESY ROBERT GAIR CO., INC.



Family identity, convenience, full protection and sales appeal are combined in these modern carriers.

PHOTO COURTESY CONTAINER CORP. OF AMERICA



Letterpress printed in three colors and varnished, this box does excellent job of displaying toy set.

PHOTO COURTESY NATIONAL FOLDING BOX CO., INC.



PHOTO COURTESY THE U.S. PRINTING AND LITHOGRAPH CO.



Fertilizer finds sales appeal in container, left, that is fine-screen letterpress printed on white clay-coated board. Cigarette carton, right, is considered one of the most important new uses of a folding box.

is made of reclaimed papers with new sulphite pulp added to give it the necessary bending qualities. Being dark gray in color, it is not suited for printing multicolor designs and is used for utilitarian boxes.

Single Manila-lined board. This is a commercial grade of folding boxboard, the top liner being made of unbleached sulphite and ground wood pulp, with the bottom liner and filler composed principally of news and mixed reclaimed papers. It is readily recognized by its Manila or off-white color.

Bleached Manila-lined board. This is a slightly higher grade made from virtually the same materials as the single Manila-lined board, but it is whiter in color. For this reason it is used very extensively for all kinds and sizes of folding boxes.

White patent-coated board. This is probably the most widely used of all grades of folding boxboards, its top liner being made of bleached sulphite wood pulp and white shavings, which gives it a good white surface suitable for almost all kinds of single-color and multicolor printing.

White clay-coated board. In the majority of cases this is a single Manila-lined sheet on the top liner of which a machine or brush-finish coating of fine, white clay, water and casein is applied to give it a beautiful smooth white finish. The clay coating levels off the "hills and valleys" found in uncoated boxboards, and produces a hard, smooth and clear white surface on which any type of fine printing, including halftones, will appear to best advantage. Consequently, it is used for the finest folding boxes made. A de luxe quality brush-finish clay-coated board, in white or colors, is also available where an extra smooth surface with a sheen is desirable.

Many folding boxes are made for products which require some special treatment be given to the boxboard. For example, they may have to resist the penetration of atmospheric moisture into the product, the loss of moisture from the product or the absorption of foreign odors by the product. Either for strength or appearance the bottom or top liners, or both, may have to be given some special treatment.

The principal special treatments given folding boxboards are:

Laminating. This is simply the combining of two or more sheets of boxboard, or boxboard and paper or films, into one by the use of an adhesive. Any one of the following objectives may be sought in such a composite boxboard: a stiffer and more rigid boxboard than either of the components; a thicker board than is practical to make on a paperboard machine; a superior printing surface; some novel color or surface effect, such as a bleached wood grain or a textile finish, like linen or burlap; an attractive appearance at less cost than could be secured by printing the boxboard; or some protective quality such as moisture or grease resistance. Transparent cellophane is frequently laminated to folding boxboard to give it a high luster as well as to provide a surface which is impervious to dust, dirt, finger marks and grease. The laminating process may be used to produce a boxboard for almost any special use which a product may require.

Silicating. "Waterglass" or sodium silicate may be applied to the bottom liner or inside surface of a folding box, giving it a hard, smooth surface impervious to scuffing or the transfer of lint as well as grease resistant.

Asphalting. Asphalt-treated boxboard is made for soap and similar products where the package must prevent loss of moisture from the product as well as safeguard it from absorbing atmospheric moisture. Because of being black in color, asphalt is not applied to the outer surfaces, but is used either as an adhesive holding two sheets together or as a layer inside the sheet of boxboard.

Paraffining. Because of its grease- and moisture-resistant qualities, paraffin is used extensively in folding-box manufacture. It may be applied to a single surface, or the entire box blank may be dipped in hot paraffin, followed immediately by immersion in cold water to set the paraffin and give it a hard finish.

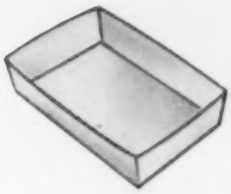
Even from this sketchy description it will be seen that a variety of folding boxboards are available for almost any special purpose required. The final choice for a particular folding box depends entirely on the nature of the product to be packaged and the special protection or effect which must be provided.

Production of boxes

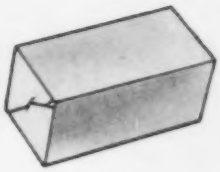
The starting point in the manufacture of folding boxes is making a layout, the chief purpose of which is to use the most economical size sheet of boxboard possible, considering these six factors: (1) the "trim" or available sheet width produced by the boxboard machine; (2) the width of the printing press; (3) the width of the cutting and creasing press; (4) the individual design, number of colors and method of reproduction; (5) the run or number of boxes to be made; (6) securing maximum economy in the use of boxboard by interlocking the boxes.

The next step is the printing of the sheets of boxboard.

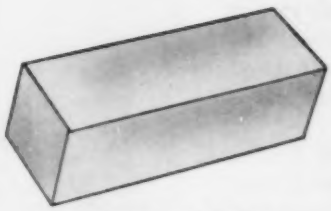
Letterpress printing. This is the most widely used process and is often known as direct printing, since the sheet of boxboard upon which the



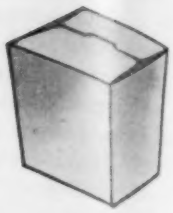
TRAYS



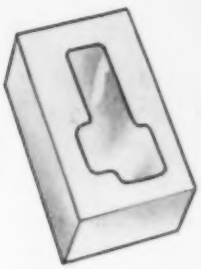
PARAFFINED CARTONS



FOLDING CARTONS



PAILS



WINDOW CARTONS

Sutherland Versatility



TITELOK CONTAINERS

Unlimited facilities — so that artists and package construction engineers can concentrate on the ideal solution to each product's package, rather than "fitting" a package to limited production facilities — is one reason why so many of America's leading manufacturers send their packaging problems to Sutherland. Keep this versatility in mind. Use its many advantages for your packages. Sutherland's complete service includes:

DESIGN — by a staff of sales-minded artists, teamed with creative and practical construction designers.

PAPERBOARD PRODUCTION — from 5 board machines, that custom-make the board best suited to the job.

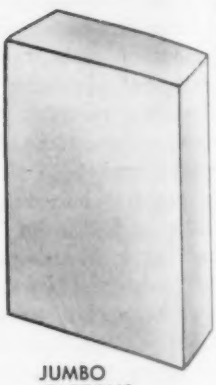
HIGH-FIDELITY PRINTING — for the sharp colors that get attention, colors are true from run to run.

CARTON MAKING — on the broadest capacity diecutting and gluing machines in the world.

SERVICE ENGINEERING — by the first field staff trained in mechanical packaging planning and machine operation problems.



MINIATURE CARTONS



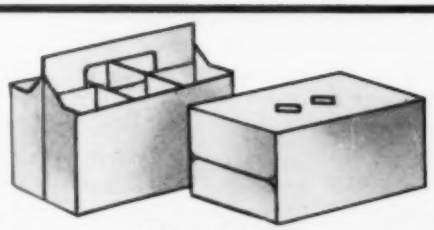
JUMBO CARTONS



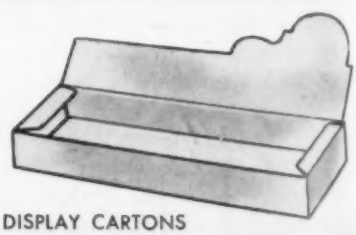
MEAT FOLDERS



FORMED FOIL DISHES



BEER CARRIERS



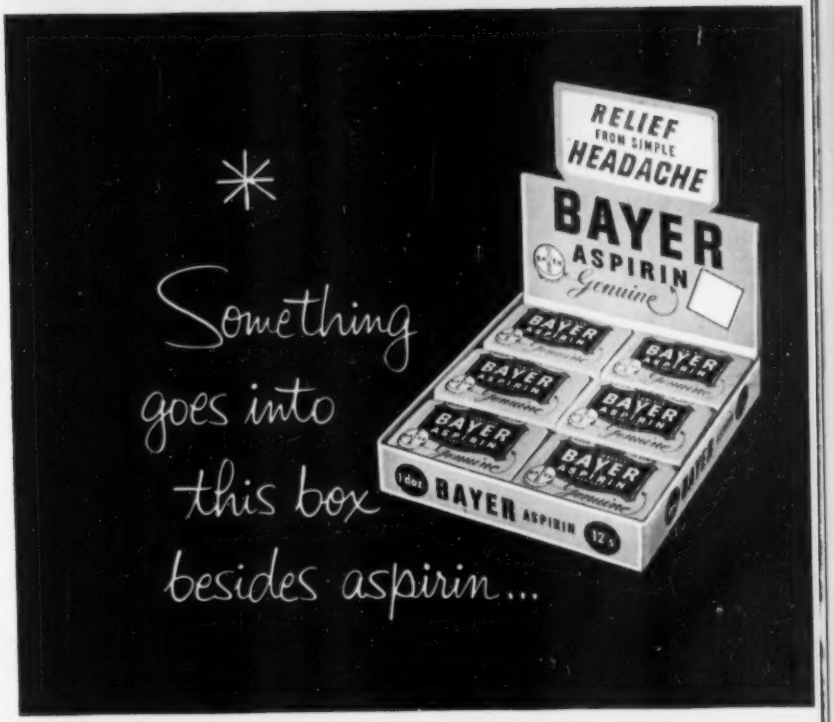
DISPLAY CARTONS



PRE-PAK MEAT BOARDS

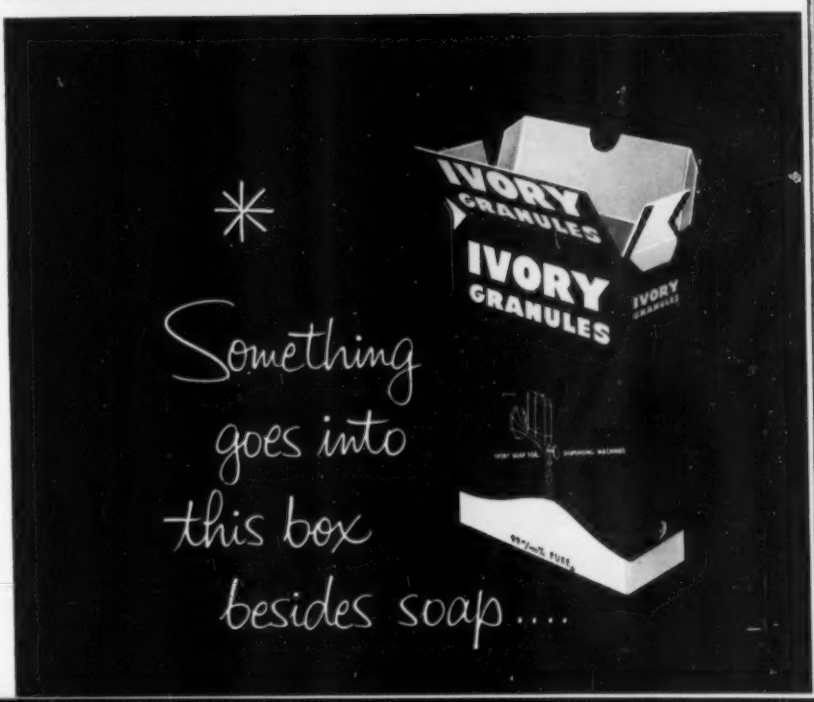
Sutherland
PAPER COMPANY
KALAMAZOO • MICHIGAN





Something to think about

Every major package user can choose from many good suppliers of folding boxes. It must be more than coincidence that so many famous products go to market "packaged by National."



NATIONAL FOLDING BOX

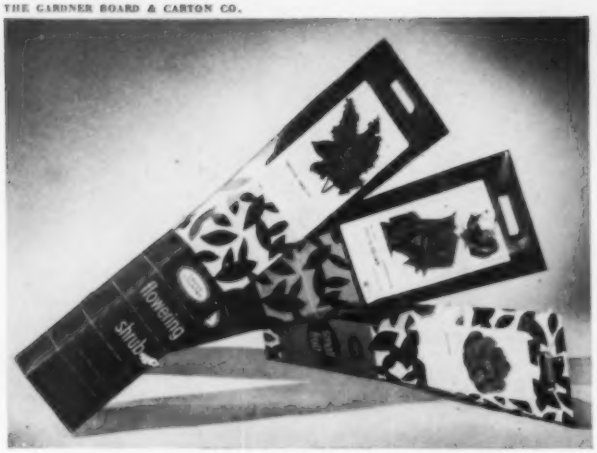
COMPANY, INC.
DIVISION OF FEDERAL PAPER BOARD COMPANY, INC.

SALES OFFICES: NEW YORK, N. Y.; BOGOTA, N. J.; NEW HAVEN, CONN.; PALMER, MASS.; STEUBENVILLE, OHIO; VERSAILLES, CONN.; BOSTON, MASS.; PHILADELPHIA, PA.

FOLDING BOX PLANTS: BOGOTA, N. J.; NEW HAVEN, CONN.; PALMER, MASS.; STEUBENVILLE, OHIO; VERSAILLES, CONN.

PAPER BOARD MILLS: BOGOTA, N. J.; MONTVILLE, CONN.; NEW HAVEN, CONN.; READING, PA.; STEUBENVILLE, OHIO; VERSAILLES, CONN.; WHITE HALL, MD.

THE GARDNER BOARD & CARTON CO.



Effective identification and utility are combined in this carton for shrubs and plants.

PHOTO COURTESY ALFORD CARTONS



Printed by letterpress in three colors, this carton is a standout on retail store shelves.

printing is to appear comes in direct contact with the metal plate or engraving. Almost any effect may be obtained with this process, varying from simple type to multicolored illustrations of great beauty. In general, letterpress printing on boxboard is notable for the clarity, sharpness and full-color values produced.

Offset lithography. This process is being more and more widely used in the production of food boxes where it is desirable to use full-color illustrations of the foods in all their appetizing goodness. Noted also because of the fine soft tones it reproduces, it is used with excellent effect in reproducing the details of fine textile patterns.

Rotogravure printing. This is a comparative newcomer to the folding-box industry and its greatest use to date has been in printing on foils and other glossy surfaces. There are relatively few folding-box plants having gravure equipment although the effects obtained on virtually all types of folding boxboards indicate it is a printing process which will be used more in the future. Whereas letterpress and lithographic printing are done on sheets of boxboard, rotogravure is a roll-fed, rotary printing method. While well adapted to large runs, this process doesn't offer at present the flexibility for various-sized editions found in the other printing processes.

Surface treatments

Although several special treatments may be given to folding boxes in their printed sheet form, space permits mentioning only one which is in common use, *varnishing.* Transparent surface coatings have been used on folding boxes for many years, the principal reasons being: to add a high sheen to the printed design; to retard, if not prevent, the fading of colors, and to protect them from dust and dirt on the dealer's shelf. They are of three major types—spirit varnishes, synthetic resins and lacquers—and may be applied in two ways, the machine—or spirit-varnish method and the plate-varnish method. In the machine-varnish method, printed sheets are fed into a machine which coats the entire surface, whereas the plate or overprint method varnishes only the printed surfaces of the box or such special areas as are desired. Both methods produce an excellent transparent gloss which adds materially to the attractiveness of the box and accounts for varnishing's wide and increasing usage.

A more economical method of securing a sheen on the printed areas of a folding box is through the use of gloss inks. In this method varnishes or resins are added to the printing ink, thereby making is possible to save an extra press impression. However, it must be pointed out that the effect is not usually so brilliant and the boxboard must be especially prepared when it is expected to take gloss inks.

While the general appearance of folding boxes is dependent on the type of boxboard used and the printed design, their real serviceability is largely dependent upon the skill and accuracy exercised in making the cutting and creasing dies. An individual die is a large flat form that carries the creasing, cutting and perforating rules or knives which crease, cut out and perforate the individual box blanks from the large sheets on which they are printed. Conforming to the printed sheets, the cutting and creasing die will carry rules and knives for anywhere from 1 to 100 or more boxes. The cutting rules are shaped to conform with the tucks, locks and flaps of the box blank and have sharp edges which cut the box blanks cleanly out of the printed sheets. In like manner the creasing and perforating rules are prepared and assembled in a definite pattern, the spaces between the rules being filled with specially shaped plywood blocks. Locked up in a steel chase or form, the top edges of the cutting rules extend above the creasing rules by approximately the thickness of the boxboard sheet, inasmuch as the former must pass completely through the boxboard whereas the creasing rules only press against it.

In general appearance and operation a cutting and creasing press resembles a printing press except that it is built stronger and heavier to perform the more rugged job. Particularly in the case of folding boxes which will be set up and filled on high-speed automatic equipment, the accuracy of the cutting and creasing die and subsequent operation is of utmost importance, for any slight inaccuracy will cause untold trouble in the packaging equipment handling the boxes with attendant costly losses of production.

The large piles of cut and creased sheets are stripped of all waste edgings by skilled operators wielding steel-faced hammers and, in some cases, using pneumatically driven hammers or drills. This leaves the box blanks ready for final processing while the strippings or "box chips" are collected, baled and returned to the boxboard mill for subsequent reclaiming and reprocessing.

The final operation consists of passing stacks of cleanly cut box blanks through a high-speed automatic gluing machine which, in one continuous

The Symbol of QUALITY and SERVICE



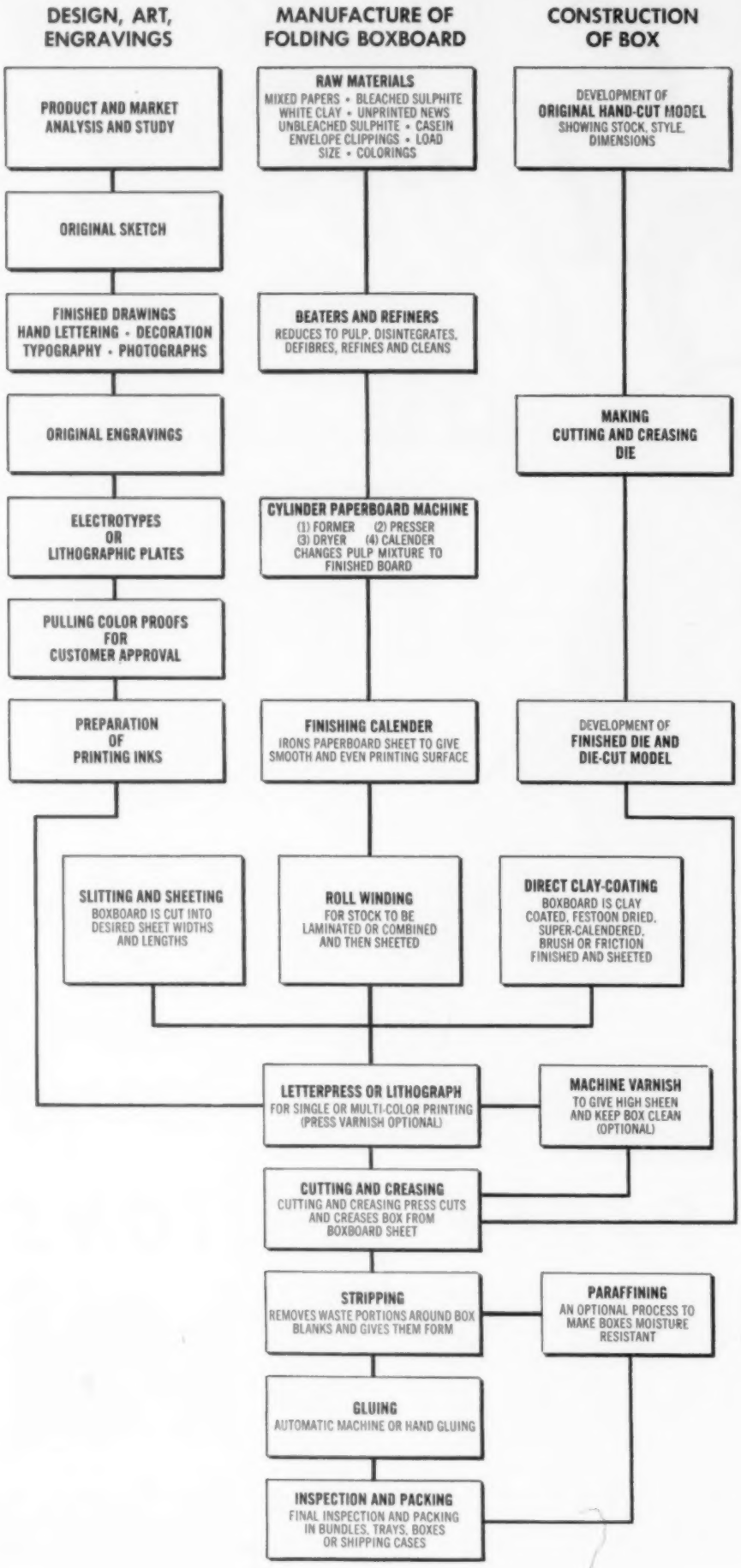
FOLDING PAPER CARTONS

FORT ORANGE PAPER COMPANY

CASTLETON - ON - HUDSON, N. Y.

NEW YORK BOSTON

STEPS IN FOLDING BOX MANUFACTURE



operation, folds, glues, counts and delivers the finished boxes ready for final inspection, packing and shipping.

Styles and characteristics

Probably no one has ever tabulated all the different styles of folding boxes which have been made during the past 50 years. However, it is safe to say such a list would total a thousand or more. In addition to the standard styles in use for many years, virtually every folding-box manufacturer has one or more exclusive styles, with modifications and entirely new styles constantly being developed to meet special needs.

In reality, all folding boxes may be classified under four major styles:

1. *The tube*—in which a sheet of boxboard is folded and glued to form a rectangular tube, the ends of which may be closed by tucks or glued flaps, or open to form a shell.

2. *The tray*—in which a sheet of boxboard is creased so its four sides or walls may be folded at right angles, being held in an upright position by gluing, stitching or locking. The tray may be made without a cover, or one panel may be extended to form a cover. An open tray is a one-piece box. Two trays may be fitted together to form the cover and body of a two-piece box, with the cover either fully or partially telescoping the box body.

3. *The folder*—usually a flat unglued blank which wraps around the product and may be glued, after filling, or held together by tucks and slits.

4. *Multi-unit container*—this may be essentially a tube or tray, or some special construction, usually serving as a counter-display unit or merchandiser, with the cover cut and creased to form an upright display panel.

Variations

Of the hundred or more folding-box styles in common use today, all of them had their origin in one of the four classifications just mentioned. It is obviously impossible to designate any one style as the "best," each style having its own advantages for some particular purpose.

A few of the principal styles are: reverse tuck; straight tuck; seal or glue end; hexagonal or octagonal; Peters; Brightwood; collapsible; one-piece with hinged cover; two-piece telescope; slide and shell; Climax, Hagen and Rose displays; step or tier

FOR

Good packaging...

SOLID FIBRE CONTAINERS

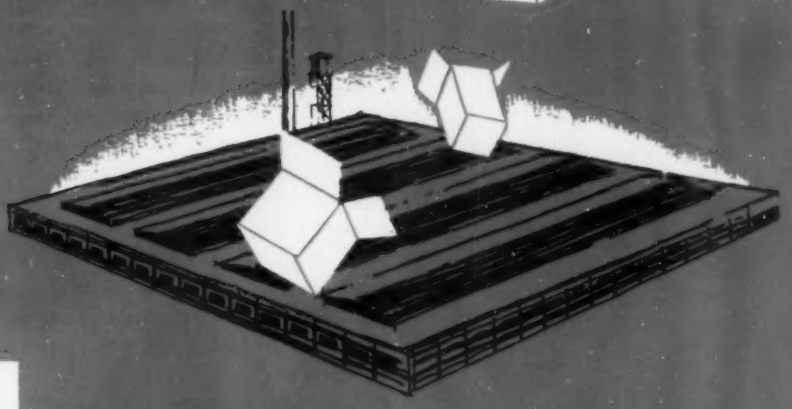
EXPORT CASES (Vus)

CORRUGATED CONTAINERS

FOLDING CARTONS

ONE-PIECE MAIL ORDER BOXES

NEW—5 Color Gravure Printing



ATLAS BOXMAKERS

ATLAS-BOXMAKERS, INC.

5025 WEST 65TH STREET

CHICAGO 38, ILLINOIS

PORTSMOUTH 7-3400

If your product is in this list it may be worth your while to call..Brooks & Porter about their new

"Ship-in-Sell-from"

folding cardboard

COUNTER MERCHANDISERS

- Aerosol Sprays
- Auto Accessories
- Cosmetics
- Electronics
- Fine Foods
- Hardware
- Industrials
- Jewelry
- Liquors
- Pharmaceuticals
- Soft Goods
- Stationery
- Surgical Supplies
- Toiletries
- Toys

One phone call or letter can convert a dust gathering package into a top-selling brand. Top sellers in 18 different fields are packaged in B & P folding counter merchandisers.

Brooks & Porter, Inc.

304 HUDSON ST., NEW YORK 13, N. Y.
ALgonquin 5-4848

Designers and manufacturers of packages and displays for over 60 years

PHOTO COURTESY EMPIRE BOX CORP.



Adaptability of folding boxes to a range of shapes and sizes for a line of products is demonstrated by this well-designed family group of boxes.

displays; gravity-flow wall hangers, and baskets.

The safest procedure for determining which style of folding box is best suited for a particular product is to seek the counsel of an experienced folding-box manufacturer. In so doing it will be good judgment to provide him with a complete sample of the product, just as it is to be packaged, and advise with him on: the kind of protection needed; method of packing planned, whether manual, semi-automatic or fully automatic; normal display; desirability of enabling the consumer to examine product prior to purchase; and convenience of opening and reclosing, if entire contents are not used at one time. Extreme fragility of a product, for example, would indicate to the box manufacturer the need for providing a supplementary platform or support within the box to assure safe shipment.

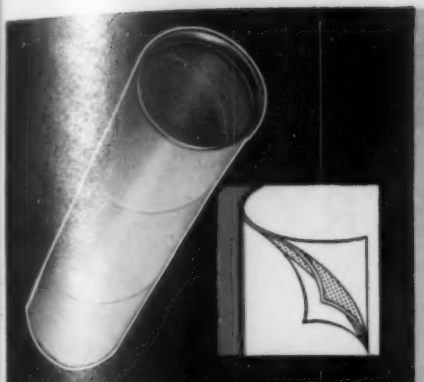
As has frequently happened, the folding-box manufacturer may have, or know of, a patented style of box having particular and exclusive features, not found in standard folding boxes, which will ideally suit a particular purpose. Failure on the part of a packager to investigate such patented styles may cause needless expense, loss of time, or place his product at a marketing disadvantage.

Even after all details of structural styling of the proposed folding box are apparently satisfactorily settled, it is a wise provision in the majority of package develpoments, to make several test shipments to make sure the protection provided is adequate to withstand the rigorous handling the product will encounter in actual shipment. For this purpose the folding-box manufacturer can readily supply three or four hand-made models of the proposed box, or if a more extensive test is desirable a supply of die-made models.

In addition to the folding boxes just described, which are "tailor-made" to meet the requirements and specifications of one specific user, there are millions of folding boxes used annually known as *stock boxes*. These take their name from the fact they are made in relatively large quantities and are carried in stock by a number of folding-box manufacturers and paper jobbers. They are used chiefly by bakeries, dry cleaners, laundries, milliners, department stores, confectioners and florists. Their principal function is to protect products in delivery from the retail store to the home. Consequently, the majority are not printed and those which are carry little besides the name, address and slogan of the retailer.

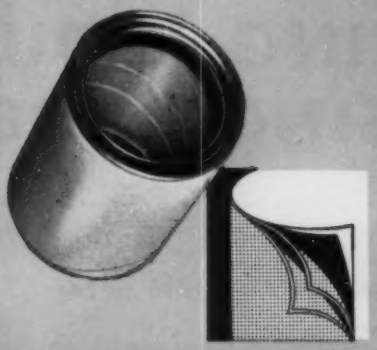
Procurement

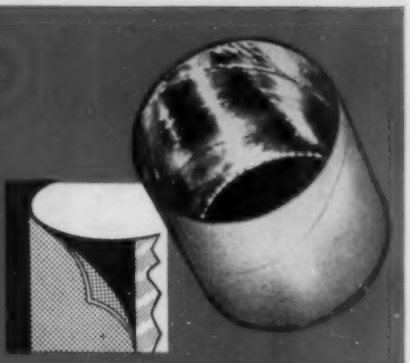
Inasmuch as the majority of folding boxes are made for particular users and are of little value to anyone else, it is particularly important that there be a perfect understanding between the man buying them and the man making them. Placing an order for a quantity of folding boxes with no more details than "as per sample" is frequently an invitation for a later misunderstanding when the boxes are delivered and fail to come up to what the buyer expected. For this reason packagers (*This article continued on page 204*)



LARDPAK LINER.
Lardpak liner inside, then fibre, and printed Lardpak paper used outside. A grease barrier for scores of materials. Example of use: caulking compounds.

LARDPAK, PITCH-BACKED.
This combination offers the packer both grease and moisture resistance. Example of use: various chemicals.



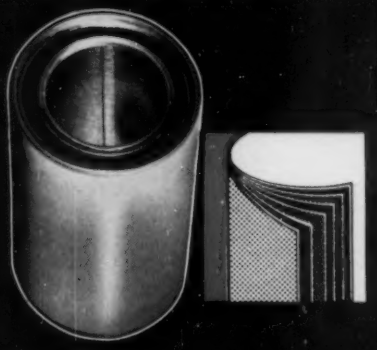


FOIL LINER.
Foil backed by pitch followed by two layers of fibre laminated with glue. Pitch serves two purposes: As adhesive for foil (2) sealer for pin holes in foil. Example of use: seed inoculants.

• There are many sides

to the R. C. FIBRE CAN Packaging Story

• a complete line to fit your packaging needs



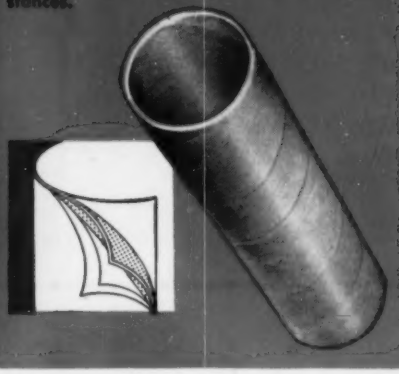
CHIP KB.
Pitch layers between layers of fibre, for moisture resistance. Convolute can shown here. Example of use: wallpaper cleaner, cold water paints.

Have You a Fibre Can Packaging Problem?
Contact your nearest R. C. Sales Office for experienced advice. There's no obligation.



PARAFFIN COATING.
Parrafin lining obtained two ways: spiral wound from coated fibre, or sprayed in convolute can. Example of use: moth crystals, drugs, etc.

LAMINATED KLEERWRAP.
Lardpak liner inside, followed by fibre, followed by two pieces of glassine laminated together with wax. High grease and moisture resistance. Example of use: caulking compounds and similar "greasy" substances.





FOIL PAPER-BACKED.
Foil backed up by 20 lb. white bond paper, which serves as inside ply of container. Ideal for packaging that requires both moisture and grease resistance. Example of use: ready-to-heat biscuits, and similar food products.

R·C· CAN COMPANY

R.C. CAN CO. The Stamp of Quality ST. LOUIS, MO.

MAIN OFFICE and Factory **9430 Page Blvd., St. Louis 14, Mo.**

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SERVING INDUSTRY SINCE 1908

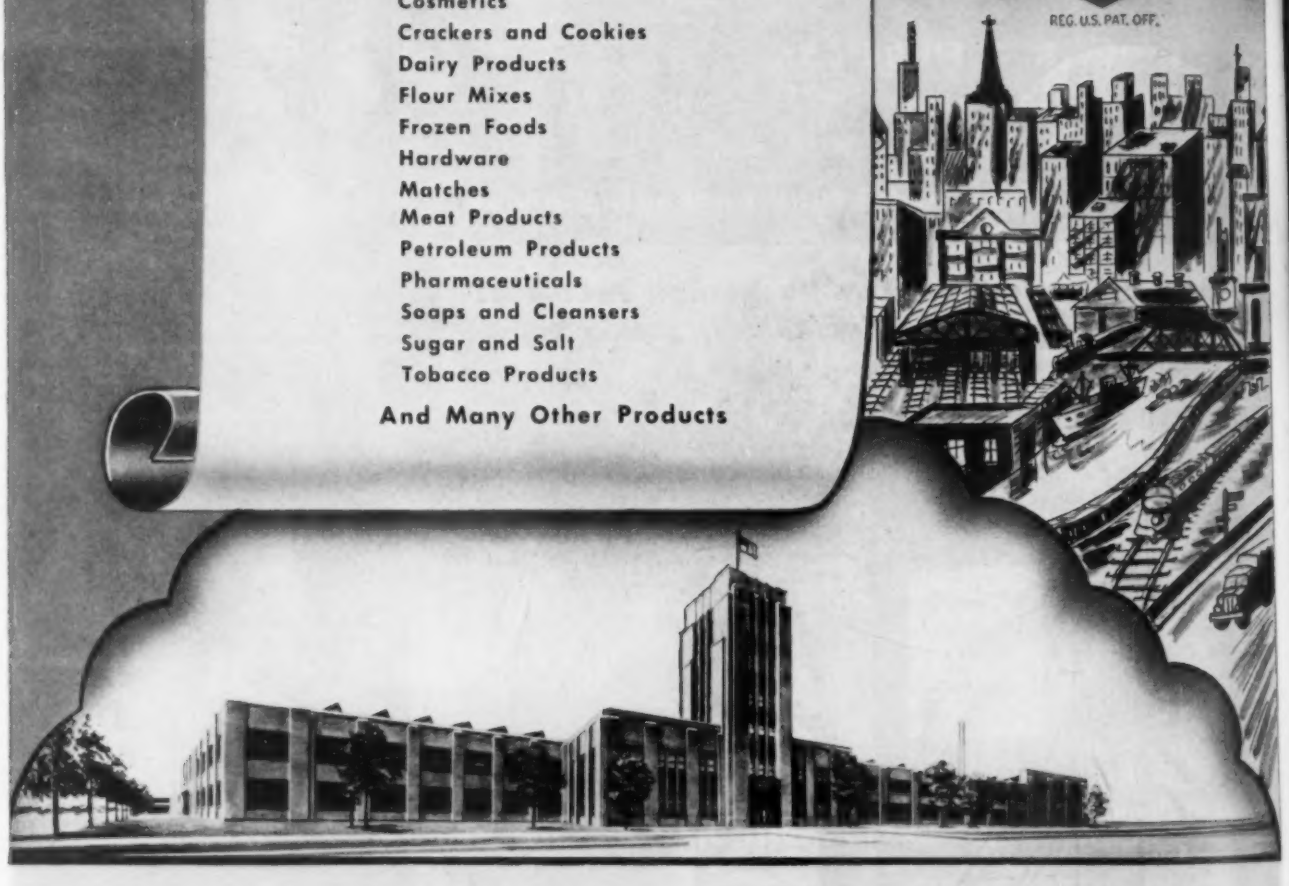
FOLDING PAPER BOXES — For

- Automotive Parts
- Bakery Goods
- Caps and Closures
- Cereals
- Confectionery
- Cosmetics
- Crackers and Cookies
- Dairy Products
- Flour Mixes
- Frozen Foods
- Hardware
- Matches
- Meat Products
- Petroleum Products
- Pharmaceuticals
- Soaps and Cleansers
- Sugar and Salt
- Tobacco Products

And Many Other Products

CHICAGO CARTON COMPANY

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Folding Cartons . . . Plain, Printed, Laminated, Paraffined



Bright "Eye-dea" in Packaging

There's an exciting fashion story in American Optical's Flame Frame! And the glamour is underscored dramatically by custom-designed Dennison packaging.

Textured gold cover paper makes a striking setting for these colorful eyeglass frames. Inside, a special platform tilts product toward the customer. The nail-hinged cover provides a rich display background. This package won first prize in the "Personal Accessories" classification in the 1955 competition sponsored by The National Paper Box Manufacturers Association — *one of seven awards won by Dennison in this important event.*

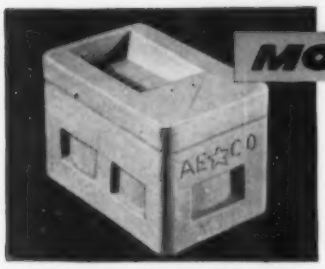
Dennison has the designing skills and the manufacturing facilities to create the right package for you — suited both to your product's personality and your purse. Find out more about how Dennison does it! Call your nearest Dennison Sales Representative or write —

DENNISON MANUFACTURING COMPANY,
Box Division, MARLBORO, MASSACHUSETTS.

LOOK TO **Dennison**

FOR PACKAGING THAT REFLECTS THE PERSONALITY OF YOUR PRODUCT

Investigate Low-cost ATCO-PAK MOLDED PACKAGES



This electrical component package is typical of an industrial use of Atco-Pak.



This realistic coconut is a distinctive gift package made by Atco-Pak.

for Product Protection
for Distinctive Design

Insure Safe Delivery! Molded pulp Atco-Paks conform to the shape of any product. This is important to manufacturers of delicate electrical parts, machinery components or assemblies and other fragile items.

Create Powerful Sales Appeal! Using distinctive design and arresting colors, your Atco-Pak says "Stop and Look" to the passing glance of potential customers.

Available Now! We will be glad to submit ideas for *your* package. *Write for full information.*

Atco-Pak Molded Packages offer these features:

- Molded in any size and shape
- Resilient—cushion against shock
- Extremely light in weight
- Exceptionally strong
- Natural or finished in colors
- Water-proof
- Inexpensive
- Molded-in name, trademark or identification

ATCO-PAK *DIVISION OF ANIMAL TRAP COMPANY OF AMERICA, LITITZ, PA.*

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reprints

to work!

Reprints of articles, features and news items that appear in Modern Packaging are often surprisingly inexpensive when ordered in quantity. Many companies make it a practice to have stories which have a bearing on their business reprinted for distribution to their own personnel, customers, prospects, stockholders or to other interested groups.

Whenever you see editorial matter of this type in Modern Packaging magazine or the Encyclopedia issue which you can use in reprint form, in quantities of 100 copies or more, write and quotations will be furnished promptly.

INDUSTRIAL MAGAZINE SERVICE
An Affiliate of Breskin Publications
575 Madison Avenue, New York 22, N. Y.

PHOTO COURTESY THE OHIO [illegible] CO.



Folding boxes lend themselves to an endless variety of seasonal or other special product-promoting themes. Impulse and multi-unit sales are boosted by this ingenious design.

generally employ detailed specifications and blueprints. Merely as a helpful suggestion, here are a dozen facts which should be mutually agreed upon at the time of purchase:

1. *Name of product* (such as 8 oz. 49-cent bottle of "—" Shave Lotion).
2. *Size of box* (inside dimensions from center to center of creases).
3. *Grade of boxboard* (specific information, such as white machine clay coated, newsback, made for gloss inks).
4. *Gauge of boxboard* (thickness stated in points, such as 0.018).
5. *Style and use* (such as reverse tuck, Arthur Locks on bottom to be hand packed).
6. *Copy and proofs* (either "approved copy attached to order" or specific date on which it will be furnished and whether black and white or colored proofs are required).
7. *Art and engravings* (whether furnished, on hand, or to be made by box supplier, at an extra charge).
8. *Printing* (whether letterpress, offset lithography or gravure).
9. *Colors* (specific colors, preferably with samples, and light and dark variations which will be acceptable).
10. *Surface protection* (if varnished, kind of varnish to be used).
11. *Packing* (how boxes are to be packed, i.e., string tied and paper wrapped, packed in trays and then in corrugated cases, etc., and method of marking cases desired to facilitate inventory control and factory use).
12. *Delivery desired* (definite dates and quantities for first shipment, successive ones and final completion of order, as well as any special instructions as to delivery).

MORE THAN EVER—THE TREND'S TO



Some require the ruggedness of a wrestler... others the beauty of a movie queen—often both are essential.

At times money is no object... more often costs are figured to the fraction of a penny.

Yes, NIEMAND BROS. PAPER TUBE PACKAGING meets the requirements of an unusually varied list of users. If you package perfume or spark plugs... it will pay you to investigate the advantages of these versatile, practical packages.

Available plain or printed—
with decorative papers and with metal,
paper or plastic closures

Illustrated literature showing many interesting tubular package applications, available on request.

NIEMAND BROS TUBULAR PAPER PRODUCTS

A Niemand Bros. "Packaging Engineer" will be glad to consult with you on your package problem.

NIEMAND BROS., INC.

Manufacturers of Paper Tube Products

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CONTAINER, F. N. BURT CO., INC.



CONTAINER, MASON BOX CO.



CONTAINER, PAPER PACKAGE CO.



The set-up boxes shown here demonstrate how well these rigid containers star when it comes to design, use of interior platforms and fitments and in accommodating awkward-shaped products.

The set-up box

by MILTON L. FITCH*

An adventurous approach to mechanical and decorative design of the set-up box has kept pace with increased packaging sales. The versatility of the inherently simple set-up box is serving the packaging industry well in its efforts to produce more salesworthy containers. Recent designs have shown originality and ingenuity in producing outstanding eye-catching, product-display and sales-appeal features.

In its simplest form, the set-up box is a rigid, lidded, paperboard-paper container delivered in finished form ready for loading. However, many other materials are being used for boxmaking and some set-up boxes come partially knocked down, so that the term is at times confusing because of the almost limitless design possibilities of this type of package.

Although there are many stock boxes and many applications of set-up boxes, most of them are "custom built" in the sense that they are designed for a particular product or a particular packaging requirement. Because of the rigidity of set-up boxes, products requiring protection from storage or shipping damage are a natural for this package form. While much of the extra strength of set-up boxes comes from the stayed or "ended" corners in construction, cover materials, interior partitions and platforms add to the safety factor. The complete versatility of various "custom built" features of a set-up box makes it possible to incorporate successfully many extra decorative or protective qualities.

Products packaged in set-up boxes are easy to store both at the manufacturer's plant and in the retail store. The rigid construction of the boxes facilitates handling and shelving. Because they are delivered ready for loading, they are easy to load and save loading time and money.

Many selling factors are involved in the choice of set-up boxes and these frequently represent the primary reason for their use. Helping to sell the product or "billboarding sales features at point of sale" is facilitated by both mechanical and artistic design. Through artistic design, covering materials—printed, embossed, decorated or given special finishes—help to identify product and stress sales features. The mechanical design, involving hinged lids, cut-out or decorated platforms and other display features, also results in greater sales for products in set-up boxes.

Basic design. The simplest form of the set-up box is made from a scored blank of paperboard from which the corners have been removed. This blank is bent on the score lines and corners are reinforced or stayed. A slightly larger but corresponding piece, provides the box lid. The material used may be rough chipboard, decoratively laminated board or another base material, such as kraft board, for extra strength. The stays are usually of 90-lb. kraft, although muslin, metal clips or other material may be used. Many varieties of adhesives are used. Some boxes are "self stayed" or "ended" by using a flap from the box sides for the stay. Envelope boxes are often made this way.

The bottom shell of the box is fitted to the lid in numerous ways. The most common is the telescope type, in which the lid fits snugly down over the base. In the partial-telescope, the lid is not so deep as the base.

One basic variation of this is the neck or shoulder style, in which the outside of the base fits flush with the lid. The base often slides into the lid like a drawer.

Covering materials and methods run a gamut of decorative effects. Mostly used are special coated papers

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Showmanship, an element so vital in packaging many products, is the forte of the set-up box, which can employ materials, printing arts and constructions in such a wide range of effective combinations.



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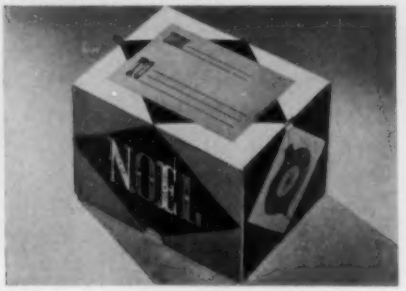
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Personal products, fancy foods, gifts, novelties and similar products find the strength and design individuality of the set-up paper box a major asset in designing a package whose character lends itself to interpreting a theme.

in a so-called "tight wrap," where adhesive is used over entire surfaces. Other covers include not only the "loose wraps" but also window cut-outs, padded covers and in some cases labeling. Some covers are applied by stripping or banding. Most materials are applied by automatic machinery.

Over and beyond the basic box, interior fittings and partitions are often included for display reasons, etc.

New designs

Product identification and protection, once major packaging considerations, have been supplemented by close cooperation between the product manufacturer's advertising, sales and even product-design personnel and the box manufacturer's mechanical and decorative designers. Such cooperation has increased the basic efficiency of the set-up box.

The influence of self-service selling is evidenced by the increase in dominant color contrast and package individuality with eye appeal emphasizing "buy" appeal in the competition for attention. Unusual, and sometimes bizarre, color combinations and design motifs vie for sales.

Special constructions

Several types of set-up boxes that vary considerably from the basic style are sufficiently common to be classified as special set-up boxes. Round boxes—from hat boxes to new cosmetic creations—are a classic example of these "specials."

The use of acetate and other plastic materials has added considerably to the repertoire of styles. Transparent display packages, because of ease of fabrication and obvious sales advantages, are rapidly exploiting the luxury market. Combinations of acetate lids and paperboard bases as well as the use of plastics in hinge forms, jewelry bases and box "windows" have increased considerably. Many set-up box plants operate transparent-box departments, as the manufacturing methods for both types are similar.

Probably one of the most unusual recent innovations is the combination set-up box or partial set-up. This combines the ease of storing flat boxes with the added strength of the rigid box. Its usual form is a set-up or stayed lid with an easily assembled flat base, usually in a solid piece.

The traditional candy box has an extended base and sometimes an extended top, with loose-wrap cover paper, usually embossed and with a shoulder style or padded top.

However, in recent years many of the traditional luxuries of the candy box have been challenged. In new packages today, only the traditional feature of loose wrapping is still paramount. Many well-established lines are aping younger competition in adopting boxes with more flash and color in printed design and fewer mechanical design features.

The loose-wrapped candy box has the advantage of being able to use all types of cover papers, including raised lettering or embossing effects and special-design papers. Some confectioners, while admitting that the loose wrap has a better "feel," claim that a tighter fitting box can be made using the tight wrap. They also claim that a tight-wrap box receives less shelf damage. Tight wraps are definitely favored for neck- or shoulder-type boxes.

Drug boxes

Pharmaceutical manufacturers are leading buyers of the set-up box because of its inherent rigidity, which protects the product. It is paradoxical that the set-up box, favored by most packagers for its eye-attracting salesmanship, should also be favored for drug products that are seldom subject to impulse buying. Nevertheless, set-up boxes, because they have a quality appeal and protect the product, enhance the character of both the product and the manufacturer. Because so much of the merchandising promotion of drug houses comprises advance sampling to doc-

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Set-up boxes lend themselves to an endless wealth of ideas in novelty as well as re-use packages. Shown here are a "file box" container, a package for silver and a barbecue-set box with a platform that holds and displays the set.

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Set-up boxes are easy to open and close. Container, left, has a safety-pin drawer pull. The Mary Chess perfume case converts to an evening purse.

tors, set-up boxes are used for mailing boxes as well as for retail boxes in regular distribution channels.

For mailing boxes, drug companies mostly favor the metal-fastener type, but many have their own cover designs—an important part of recognition appeal to doctors. Easy to load, and with partitions and platforms for versatility, the set-up box lends itself admirably to drug needs. It can be made tamperproof, dated and sealed with control symbols. It is easily stored and its rigid cover provides protection during use.

Many new drug boxes have been introduced using the inherent strength of the set-up box plus interior fittings to package medical and surgical instruments as well as single-medication kits. The kit has been an important package in the introduction of new biologicals and serums.

Cosmetic packages

In no other field is the versatility of the set-up box or the ingeniousness of the box designer better exemplified than in cosmetics. The one common feature is showmanship and any resemblance to the simple blank type of box is hardly noticeable.

Through the years, cosmetic-package design has evolved from mere protection and identification to the point where today in many cases the package is the major sales factor. With an almost unlimited choice of papers and other materials and with an infinite variety of basic designs at his command, the designer can produce cosmetic boxes that take on novel forms while retaining protective construction features.

Jewelry boxes

One of the essential factors in the design of jewelry boxes is the ability of the package to display the product adequately and give it a quality background. That is why so many jewelry boxes feature plush interior linings, platforms and hinged covers.

The distinction of most jewelry boxes is usually backed up by durable cover materials and protected container edges that withstand frequent handling. Set-up boxes can be manufactured at relatively low cost even in limited quantities and many basic designs adapt themselves easily to a variety of sizes. Thus, one jewelry manufacturer can use similar boxes for different products.

Metal, usually gold or silver plated, and plastic skeletons are frequently used, with spring snap hinges. Many manufacturers sell stock boxes to retail jewelers with store-name imprint. A good many jewelry items are now packaged in some form of transparent box cover to give good display, cut down handling and protect from dust.

Blank boxes

A sizable number of products, particularly shoes, envelopes and hardware, use a blank type of box produced on cutters, creasers and, either hand or automatic, formers and gluers. Most of these blank boxes are made from printed board blanks. Because of registration and screen problems, they are less attractive than boxes of the wrapped type.

In shoes, with the advent of many national trade names more wrapped boxes are being used, as the printing on paper adds salesmanship to the box. While many stores re-use shoe boxes from bulk inventory, more and more stores give out the boxes as a take-home reminder.

For envelopes and many other paper goods, the ended type of blank box with label is still a popular package. Adequate rigidity and easy identification for office and stationery-supply storage are chief requisites. However, with more trade-name sales over the counter, many stationery manufacturers are finding it expeditious to use wrapped set-ups.

Self service in hardware stores has made increasing demands on manufacturers to improve the salesworthiness of hardware boxes. Because of the weight of the product, hardware demands a rigid type of container. Many hardware boxes use a metal corner stay on a blank box.

A new trend in hardware is in set and kit packaging, where related products are packaged together and sold as a unit. Using printed or special paper wraps has improved the sales appeal of hardware items.

Mailing boxes

New developments in the manufacture of paperboard have made possible a mailing box that gives greater protection per ounce of weight than its predecessors. This advantage, plus ease of loading, adaptability for interior fittings and general appearance value, has increased the sales of set-up mailing boxes.

Two types of closures, the metal fastener and the sealing flap, are used in mailing boxes. The metal-wire fastener type of mailer has two slits in the cover that take the fasteners; those with gummed flaps usually fold around the base.

Within the limitations of the postal regulations many identifying and decorative wraps are used on mailing boxes and mailing-box manufacturers offer "long run" customers many decorative choices at little extra charge.

Salesmanship features

Because of the versatility that can be built into the set-up box, there is an increasing tendency to vary from the traditional box design both mechanically and decoratively. Today, before recommending a package design, the box manufacturer analyzes the product, method of distribution, storage factors, competition and sales features. He frequently suggests a test run to gauge public acceptance. Often a feature built into the box and not inherent in the product itself will make the difference between failure and success. The total design of the box, including the type of box, reading copy, interior fittings, materials used and decorative style, plus any take-home or re-use features, all add up to public acceptance.

After analyzing the product, most manufacturers make a flat sketch showing some of the sales features of the box. Upon approval of the general idea, a complete mock-up is made and cost figures are submitted.



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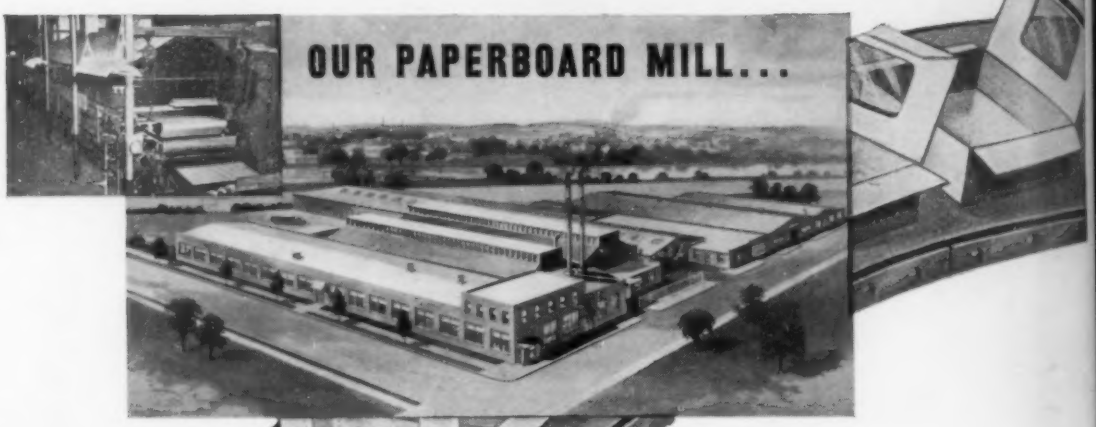
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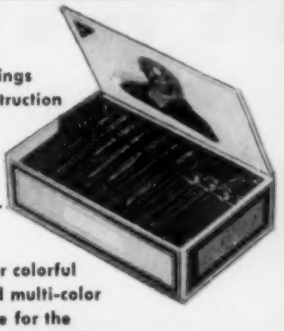
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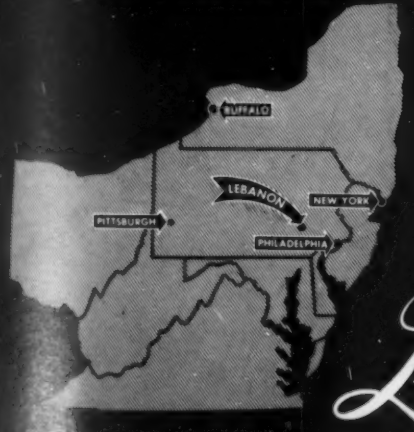
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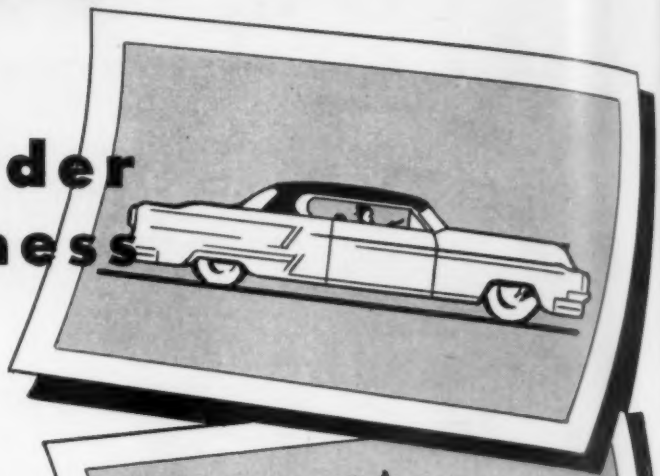
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All-paper and composite containers

by C. B. GRAVES*

The term "fibre can" is actually a misnomer. Through the years this name has been given to the product of an industry devoted to producing rigid, multi-ply paper can bodies with metal or paper ends. Gradually the terminology "all-paper cans" and "composite cans" is superseding the old usage of fibre cans.

The all-paper can produced by the fibre-can industry is limited to the cylindrical shape. The composite, or paper body with metal end, type permits the production of round, square, rectangular, triangular, oblong and oval shapes as well as a wider range of end closures because of the working ranges possible with metal ends.

Materials

Unlike the folding-carton industry in which the printing of the outer surface is a part of the product, the fibre-can manufacturer ships unlabeled cans or applies the customer's label at the time the can is manufactured. As a result, there is no printing problem involved in the production of paper cans. Further the customer has at his disposal the resources of the printing industry for the specialized product of his label for maximum appearance and merchandising appeal.

The paper used in the body walls of the fibre can covers the full range of the product. While many cans are produced of the conventional chipboards and boxboards throughout the entire body wall, it is possible to use combinations of these and other papers such as kraft and jute with specialty layers—foil, glassine, etc.

* Vice President, Sefton Fibre Can Co., St. Louis, Mo.

The ends of fibre cans are produced from either paper or metal. The paper used, in general, is a strawboard with a colored liner outside, used either plain or in combination with parchments, glassines and foils inside. The strawboard lends itself to cap production, because it absorbs the moisture applied during the cap-making operation and in drying out the cap shrinks tightly to fit the contour of the paper body.

Tinplate and lacquered black plate represent, by far, the major usage of metal in the fibre-can industry. Some aluminum and specialty-coated steels are used but only in a minor way. It is possible to coat, lacquer or lithograph both the tin and the black-plate ends to achieve a wide range of color combinations for outside appearance and for inside product protection.

Practically all fibre cans are of the multi-ply construction, which means a wide range of adhesives are used in the production of the bodies. In general, corn dextrins and animal glues are the most common adhesives, but asphalts and asphalt-wax emulsions and latices are also used for specialty papers and for specific functional properties to be imparted to the package. Paraffins and waxes are widely used as inner body coatings. Generally, this material is applied in a flushing and draining operation, although in some cases an impregnation is sufficient for more limited protective requirements.

Methods of manufacture

Slitting. Papers used in making fibre cans are purchased in large rolls which must be cut to size dependent on the body manufacture method and, of course, the height of the ultimate container. Conventional slitters are used. These machines are capable of handling rolls weighing approximately a ton with an outer diameter of 45 in. and a length of 72 in.

Blanking the ends. Metal ends are produced on conventional power punch presses. Since metal-working dies are required for each size produced, the widely diversified operation demands a considerable investment in tools and dies, particularly of the metal variety.

Body making. Two widely different methods are used in forming the bodies of fibre cans. The older method is the *spiral production* which, as its name signifies, produces tubes with the bodies formed in a spiral consisting of two or more plies of paperboard with or without liners. This body form is produced by pulling the paper over a stationary metal mandrel with endless rubber belts. The tubes produced in the spiral operation are cut to length with a saw, which operates as part of the machine. The saw cut is a rough one and, unless the product is to be used as a tube, a recutting operation is required. This recutting operation is performed on a rapidly spinning metal mandrel against which are brought a series of knives to cut the tubes into can lengths. When labeling operations are necessary, they are usually performed in tube form and then the cans are cut from the pre-labeled tubes. In some cases, the cans are labeled by the customer after filling but this is the exception not the rule.

Convolute-wound cans. The second general type of fabrication is performed on a convolute winding machine. This, as its name signifies, winds the paper over itself with glue in between the plies to create a rigid body. The main advantage of these machines is that the body so produced has greater strength than the spiral body and also permits automatic labeling at the time the can body is produced. The glue applied during the manufacture of the convolute can bodies not only acts as the adhesive between the plies but also a residue is left on the outside to which the la-



PHOTO COURTESY THE AMERICAN CAN CO.

Variety in container styles and in product uses is shown in this group of paper cans with metal ends.

PHOTO COURTESY SEFTON FIBRE CAN CO.



Three very modern uses of paper cans are shown here. Note the tear strings for easy opening and the attractive designs.

PHOTO COURTESY THE CANISTER CO., INC.



Easy dispensing makes the dust gun a "natural" for garden sprays and other chemical specialties.

bel is applied as the can strips from the metal convolute mandrel. Again the convolute body construction permits the production of shapes other than round. Unlike the spiral operation, the mandrel rotates after the paper is gripped by a mechanism built into the mandrel. A predetermined set-up of the machines permits production of 2-, 3-, 4-, 5-, or 6-ply cans.

Affixing the ends. As in the punch-press production of metal ends, different types of seamers are available depending on the quantity of cans being produced. In general, semi-automatic, foot-operated machinery is used for affixing the bottom. When the top and bottom are both applied at the manufacturer's plant, it is necessary to leave a plug opening for filling the can in the customers' plants. Where the quantity justifies, fabricating equipment is rented to the potential user by the can manufacturer.

Packing and shipping. LCL and LTL shipments of fibre cans must be made in corrugated containers with the exception of local truck shipments. For carload and truckload shipments, bag packing is permitted and for this purpose 95-lb. kraft bags offer sufficient protection to insure safe arrival at destination. The shipping of fibre cans points up one definite limitation which is the fact that, since the cans are pre-formed and are not capable of being nested, a good deal of space is lost. Fortunately, however, special freight rates are set up which make it economical to ship fibre cans.

Size ranges. Fibre cans are generally available in diameters up to 8 in., with heights up to 20 in. In irregular shapes the maximum across-corner dimension is 8 in., again with a 20-in. height maximum. Most of the volume of the industry is made up of sizes from 1 through 3 in. in round cans and equivalent sizes in other shapes.

Products packaged

Fibre cans continue to find wide application for packaging dry products. These include food products, drugs, chemicals, hardware and automotive parts. To fit a multiplicity of products, it is necessary to have many different styles and types of openings. These include the friction plug opening, dredge tops, spouts, planetary turn tops, screw tops, perforations, both semi and full, as well as telescopic and a special string opening.

Specific food products packaged include spices, salt, cereals, cracker and bread crumbs, cheese, cocoa, biscuits, baking powder and frozen foods. Many of the nationally known and largest food producers are included among the users of fibre cans with the result that some of the well-known brand names are traditionally associated with the all-paper can.

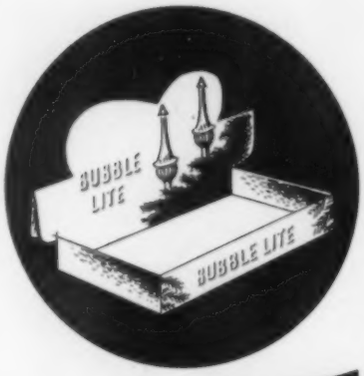
Frozen foods packaging represents the newest field entered by fibre cans. The demand for a leakproof, economical, attractive package for frozen fruits with syrup was met by an oblong composite can. This has met with wide packer and consumer acceptance just as had the packages for the products listed previously.

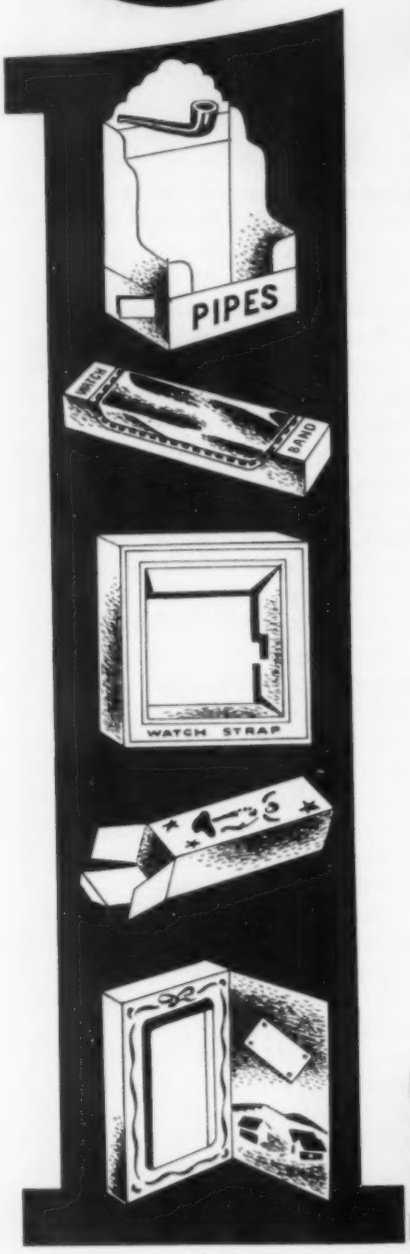
Functional limitations to the fibre can are being overcome as new materials are made available for incorporation into the body structure and new coating techniques are exploited for the metal ends. Thus the traditional limitation to dry products is disappearing as such items as frozen soups, prepared foods, caulking compounds, hair dressings and similar semi-liquid products are successfully packaged. More progress in this direction is clearly indicated by current development work in the industry.

Deserving of special mention is the growing adoption of foil labels to fibre cans. The ability to incorporate protective and merchandising appeal of foil has been recognized by leading manufacturers of such diverse items as cheese, salt, cleansers, prepared biscuits, baking powders, car washes and others.

Due to its very nature, the all-paper and the composite fibre can offers a chance for economy over the standard all-metal package. Generally speaking, the metal costs for the ends are comparable with the metal con tainer. The economy can be achieved by the substitution of paper for the metal side wall. The industry, for years, has worked to increase the quality of the side wall while maintaining the cost differential.

A composite fibre can offers important merchandising advantages. It is a rigid package. It can be labeled for maximum appearance value. It offers a variety of easy-opening features and the provision for a substantial closure. It can be furnished in many sizes, shapes and types for a wide variety of products.





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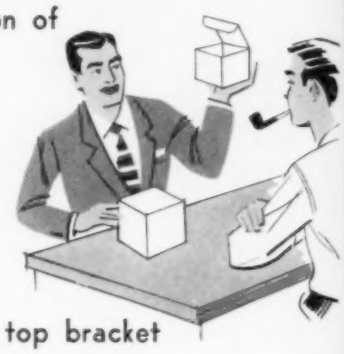
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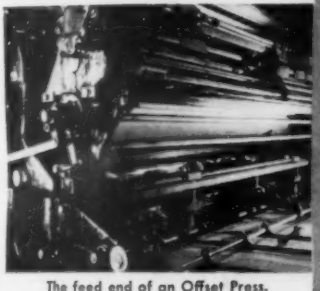
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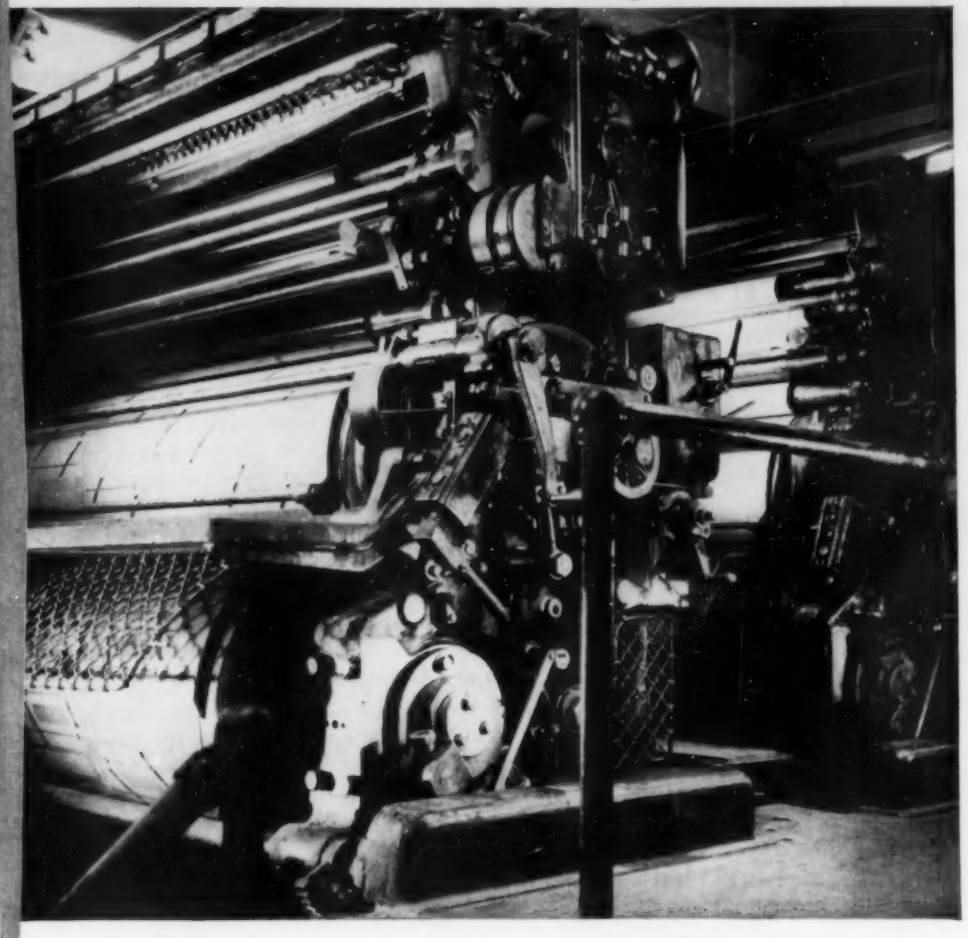
The ink-roller stack of an offset press.



The feed end of an Offset Press.



Assembling a cutting and creasing die.



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PHOTO COURTESY SEALRIGHT CO., INC.

Window-type ice-cream container lets shoppers and home users identify flavor and color by sight.



Easy-pouring spout helps make work easier, avoids muss and extra cleanup of utensils.

Liquid-tight paper containers

The place of liquid-tight paper containers in packaging has been enhanced by the swing toward prepackaging and self-service merchandising of foods.

Manufacturers of paper containers were quick to exploit the advantages of their lightweight package forms for dairy products, delicatessen items and freezer foods. More brand names continue to appear on these colorful sanitary containers, which shoppers find convenient because they are easy to carry, store, open, use and discard.

Liquid-tight containers have shown numerous improvements in recent years, including the use of better grades of paperboard; development of better types of waxes with resin additives, and superior waxing methods for greater moistureproofness, higher surface gloss and better adaptability to automatic machinery.

Other improvements include consumer-convenience features like easy-opening tabs, nonspill reclosable pouring vents, window lids and surfaces that permit easy product "spooning." Strength and design characteristics enable liquid-tight containers to perform a full use cycle, including processing, distribution, merchandising, home storage and table use.

In some instances the container may even offer special properties that permit it to be popped into the oven for heating. For example, one firm packages individual pies in a window-type container that withstands both freezer storage and oven heating.

Another firm bakes date-pecan loaf right in the plastic-coated nested container in which the loaf is merchandised. The fresh, relatively fragile loaf need not be disturbed in removing it from the container, which is slit down the side, exposing the cylindrical delicacy so it can be neatly sliced for serving. This type of container thus offers special advantages.



PHOTO COURTESY PLAX CORP.

Formed polystyrene lids team up with paper containers to provide effective food package.



Twin-pack quarts of milk designed for modern trend.

Nested containers

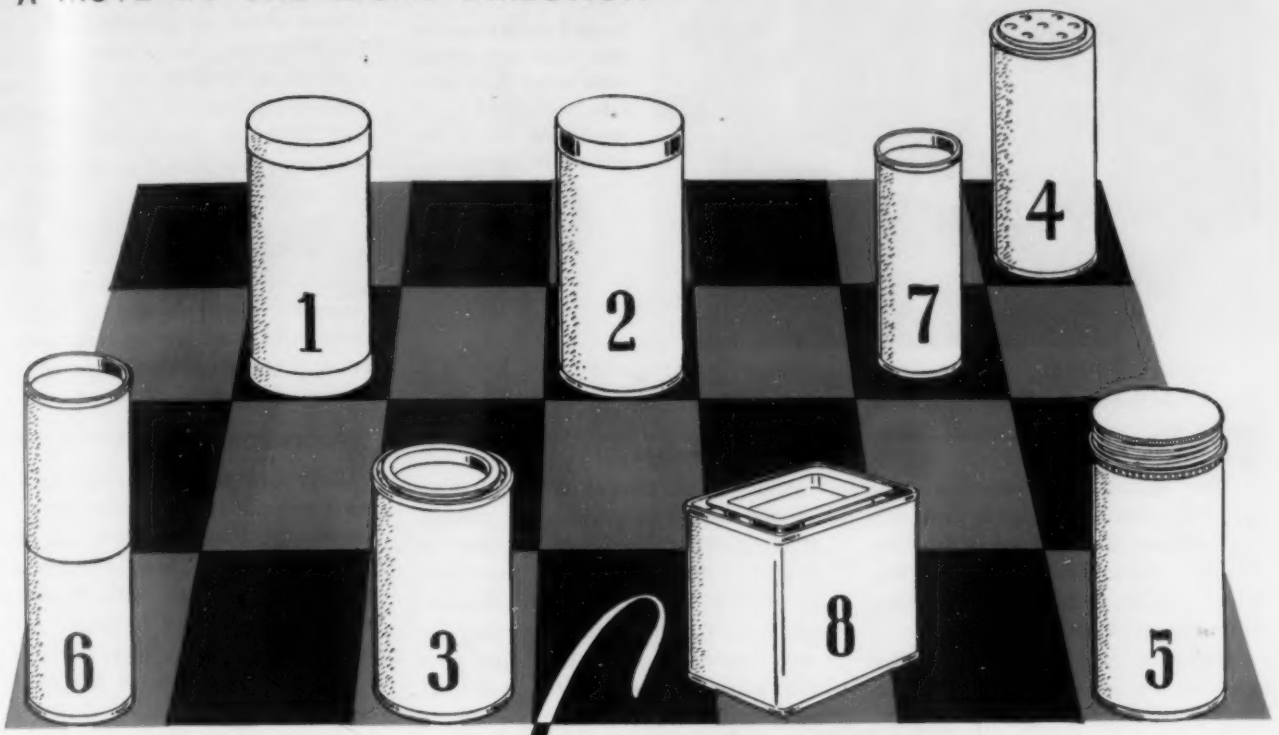
Virgin sulphite or sulphate stock is used for nested containers, treated or untreated, depending on the end use. The common treating material is pure paraffin, which adds strength and beauty and resists penetration by water, moisture or other elements that would destroy the untreated package. The sloping side walls permit nesting, at considerable savings in storage and shipping. Lids are either of the cover-all type or the snap-in (plug) type. Plug lids have stitched-on pulls or an integral die-cut tab. The lid fits tightly into a formed groove below the rim.

Nested containers can be of single- or double-wall construction. Single-wall types are always treated for strength and rigidity. They are in greatest demand for ice cream and other frozen desserts. Double-wall types are available, both treated and untreated, in two shapes—tall or tumbler shaped and squat or tub shaped. The tumbler has few retail package uses, but the squat shape has a wide range. It comes in one-unit sizes for ice cream and certain perishable precooked foods sold fresh, as well as for pre-cooked frozen foods packaged at high temperatures, cooled and stored in self-service cabinets.

Waxed nested containers pre-package a broad line of dairy products like cottage cheese, sour cream and whipped butter; frozen foods, particularly fruits packed in juice or syrup; crustaceans and other sea foods; meat products and by-products, fresh or

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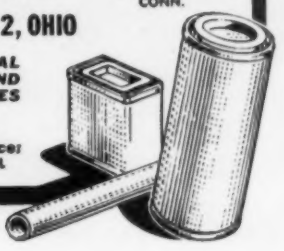




PHOTO CO RIES TRIANGLE PACKAGE MACHINERY CO.

Nested containers on this line are filled with salad and have lids applied at speeds of 20 to 25 units a minute.

frozen, including sausage, lard, liver, brains, etc.; nut meats, candy, honey and fruit butters.

The transparent window has achieved steady popularity especially in small unit sizes of food perishables. Window types provide product visibility in the freezer and encourage sale of items of limited shelf life.

Untreated and wax-treated nested containers have not proved satisfactory for the packaging of certain products having a high mineral- or vegetable-oil content or which must be packaged at high temperatures and protected against the possibility of dehydration during prolonged storage.

Canister shapes

Cylindrical, conical or rectangular shapes are usually made of manila stock, plain or lined with sulphate or sulphite. For specific end uses canisters may be lined with parchment, glassine or cellophane. They may be used treated or untreated. Pure paraffin and the more recently developed vinyl formulas provide the coatings.

Dairy-product manufacturers, meat and frozen-food packers and sea-food distributors offer perishable or semi-perishable foods in the canister styles, which have also been used for vegetable shortening and powders.

Heavy demand continues for the plastic-coated rectangular milk cartons released to the dairy industry in 1949. In the fluid quart size, scored plastic-coated sheets of paperboard are delivered to the dairy where they are resterilized immediately before use, formed into cartons, filled to measure and sealed in a high-speed operation on a machine leased to the dairy by the container firm.

The older cone-shaped milk package continues to service dairies which market in glass as well as paper. The cones are filled and capped with the same equipment as the glass containers and can be worked right into the regular dairy production run.

Ice-cream containers

Bulk-pack paper containers have almost entirely replaced other types for ice-cream deliveries from manufacturer to retailer. Most of these are cylindrical in shape with metal-edge reinforcements, but a square shape in a 3½-gal. size has been marketed.

With the increase in adoption of deep-freeze units in the home, the packaging of ice cream has changed noticeably in emphasis. A popular package for ice cream in the home today is the ½-gal. round liquid-tight paper container.

A trend, consolidated noticeably in recent years, has brought strong color to the retail dairy freezer. Teamed with sharp brand marking, color provides instant identity among standard container shapes of the kind of milk, cream, cottage cheese, ice cream and other dairy items the shopper wants. One leading dairy has printed its pasteurized whole milk carton in navy, its homogenized milk in red, buttermilk in green, skim milk in light blue, chocolate milk in brown, eggnog in cinnamon, light table cream in deep green and heavy cream in brilliant orange.

Among the recent significant developments involving liquid-holding paper containers are (1) the introduction of a "built-in" pitcher-style pouring spout designed for gable-style paper milk containers[1] and (2) the introduction of an automatic case packer for milk filling lines handling rectangular-shaped paper containers.[2]



CONTAINERS, AMERICAN CAN CO.; PACKER, STOKELY-VAN CAMP

This case packer packs 20 cartons with a single stroke to mechanize important step in milk packaging. Dairy industry fills 10-billion cartons a year.

[1] See "Milk-Pitcher Carton," MODERN PACKAGING, Dec., 1953, p. 98.
[2] See "Case Packer for Milk in Fibre," MODERN PACKAGING, March, 1954, p. 118.

Selling dry cereals?



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"America reaches for **MICHIGAN** *Cartons"*

MICHIGAN CARTON CO.

Battle Creek, Michigan

Types of Carry-Cartons Used in Multi-Unit Packaging

Until recently, variations in the construction of carriers were endless, depending on the details of die cutting, scoring and gluing, but with the demand for high-speed, mechanized handling there is now a noticeable tendency to concentrate on a few basic designs. Carriers, as they are evolving today, may be placed roughly in five basic categories:

1. *Open-top or basket type.* This type is the oldest and most familiar, having started with bottled soft drinks a number of years ago. For bottles, this type is usually designed with partial partitions or dividers to hold each bottle individually and with a die-cut, upright handle. Open-top and basket styles are also suitable for carrying cans, but for this purpose are usually made without dividers and are equipped with slots or locking flaps to keep the cans in position. They may be set up and loaded with bottles or cans by a number of different machines.

2. *Can band or sleeve type with locking end flaps.* Patented carriers of this type are supplied in the form of pre-fabricated glued paperboard sleeves with end flaps that lock into the chimes of the end cans to hold the unit in place. The cartons may be applied by hand or by special machines which set up the sleeves and insert the cans. They have the advantage of accommodating odd as well as even numbers of units, such as threes and fives as well as twos, fours and sixes. They may be made either with thumb holes or stand-up handles.

3. *Wrap-around, flat-sheet type with die-cut slots.* This carrier is supplied as a flat, unglued, die-cut and scored sheet which is wrapped around the assembled cans and glued by special machinery supplied with the carton order. Positioned slots in the sheet lock each of the cans in place. These patented cartons may be equipped with thumb holes or stand-up handles as desired. They are made by a selected number of licensed carrier manufacturers.

4. *Sealed-end type.* The construction of these carriers is as simple as a sealed-end square or rectangular carton, made with die-cut holes as a carrying convenience or with an upright handle. They may also be made with an open top to accommodate bottles or cans. They may be produced by any carton manufacturer and can be loaded automatically on high-speed can- or bottle-packing equipment.

5. *Specialties.* Many custom-designed constructions may be ordered, tailored to specific uses, such as for glassed products, assortments of food delicacies, confections, etc. Usually these are set up and filled by hand.

A reportedly promising new tray type of carrier is also being studied by the fruit-juice-concentrate, canned-soup and vegetable packers. It permits full view of the cans on their sides, holds them in place by locking flaps and may be made, without glue, of wet-strength board to withstand moisture of refrigerated display cases. Special machinery has been designed to provide a system for setting it up and inserting the cans, and loading the trays into cases. Market tests have already been conducted by the Florida Citrus Commission.

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(Index to Volume 28, September 1954 through August 1955)

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This Cumulative Index is actually a two-in-one affair: an extremely detailed Alphabetical Index of Subjects plus an Index of Authors.

In the Alphabetical Index, each basic listing by subject is alphabetically cross-referenced by *industry*, by *container type*, and by *material*. As a result, users of the Index are enabled to carry out truly exhaustive packaging research assignments on "short order" and with minimal effort.

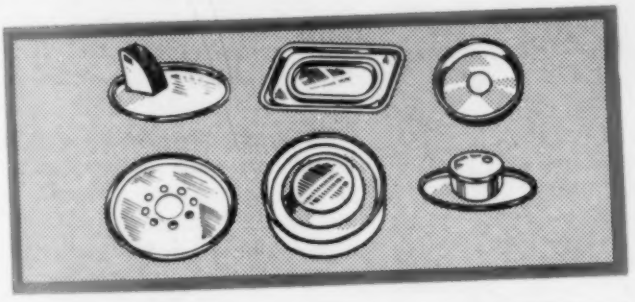
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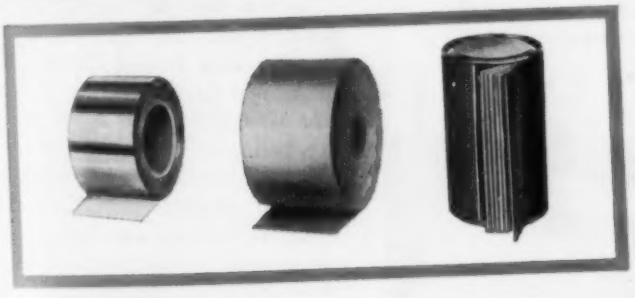
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Molded-pulp containers

Molded pulp has long been used in this country as a cellular package or cushioning tray for products like eggs and fruits, while molded-pulp trays have been standard equipment in delicatessens, dairies and bakeries for the unit packaging of sauerkraut, potato salad, pies, etc. With the growth of pre-packaging, these trays now are widely used on meats with an overwrap.

In England and on the Continent molded pulp is found in applications requiring greater strength, achieved by impregnating the pulp with resin. In this country reinforced pulp is coming into use for industrial applications which incorporates sisal or other fibres and resin additives.

In novelty shapes—some of them clearly seasonal applications like Easter bunnies and Christmas Santas—molded-pulp forms made by the blown method are used to package candy and certain dry merchandise. The suction method is used for the mass production of egg containers, pie plates and shallow trays.

New wood pulp or reclaimed paper stock supplies the basic material for molded-pulp packaging. The pulp is dyed for color effects or is brushed or sprayed after fabrication. Finished containers are sometimes lacquered to provide a high gloss. Lettering and trademark may be embossed or debossed at time of molding.

Two purely industrial packages recently adopted by American manufacturers are worthy of remark. It should be noted that in each case the search for a new package was dictated by the fact that the method in use left something to be desired in cost or performance.

A manufacturer of electronic power tubes was dissatisfied with the 17-piece package he was using, which was bulkier, heavier and more expensive than he felt it ought to be. His new package consists of a corrugated or fibreboard carton and a two-piece block of lightweight, pressed fibrous material, molded on the inside in a die shape of the tube. The resultant three-piece package is smaller, lighter and about half as expensive.

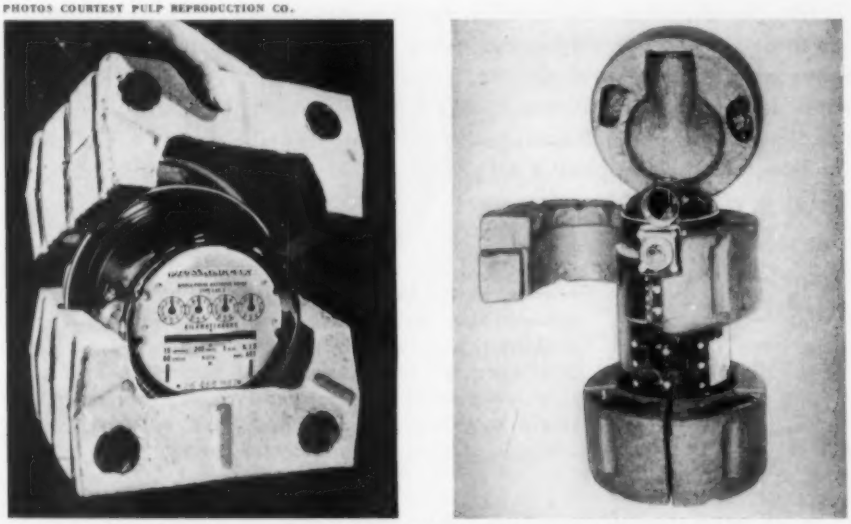
In another application, a two-piece container resembling a molded egg carton packages eight spools of heavy wire. Both spools and shipper are reused. Container specifications called for light weight, no sharp corners, no splinters, a minimum of interior packing, easy removal of spools, a handy storage and dispenser tray. Empties are returned.

The double shell of the new container is vacuum pre-formed and pressure molded to dimension. The outer shell is partially impregnated with a resin solution, while the liner is coated with a vinyl-base resin that improves shock and scuff resistance. The liner is only half as hard as the outer shell, so that it cushions the contents and "grips" the spools firmly when the two halves are strapped together.

A new twist to a classic use of the molded-pulp tray has cut a Northwestern fruit packer's labor costs by 15 to 20% in the crating of cherries. The tray, 10½ by 15 in., is placed in the bottom of the crate and carefully filled by hand—with one cherry, stem side up, in each molded depression. After the compact row facing has been completed, the rest of the crate is random filled and the lid nailed on. At the fruit market, the box is turned over and the bottom removed. The pulp tray is lifted off, showing a symmetrical layer of cherries.

As a decorative package a camera manufacturer has adopted a display container that employs a velour-covered molded-pulp base.

PHOTOS COURTESY PULP REPRODUCTION CO.



Contour-shaped packages of molded pulp can be used effectively in cushioning and protecting various types of sensitive electrical equipment.

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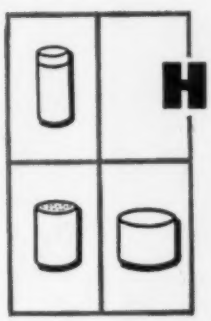


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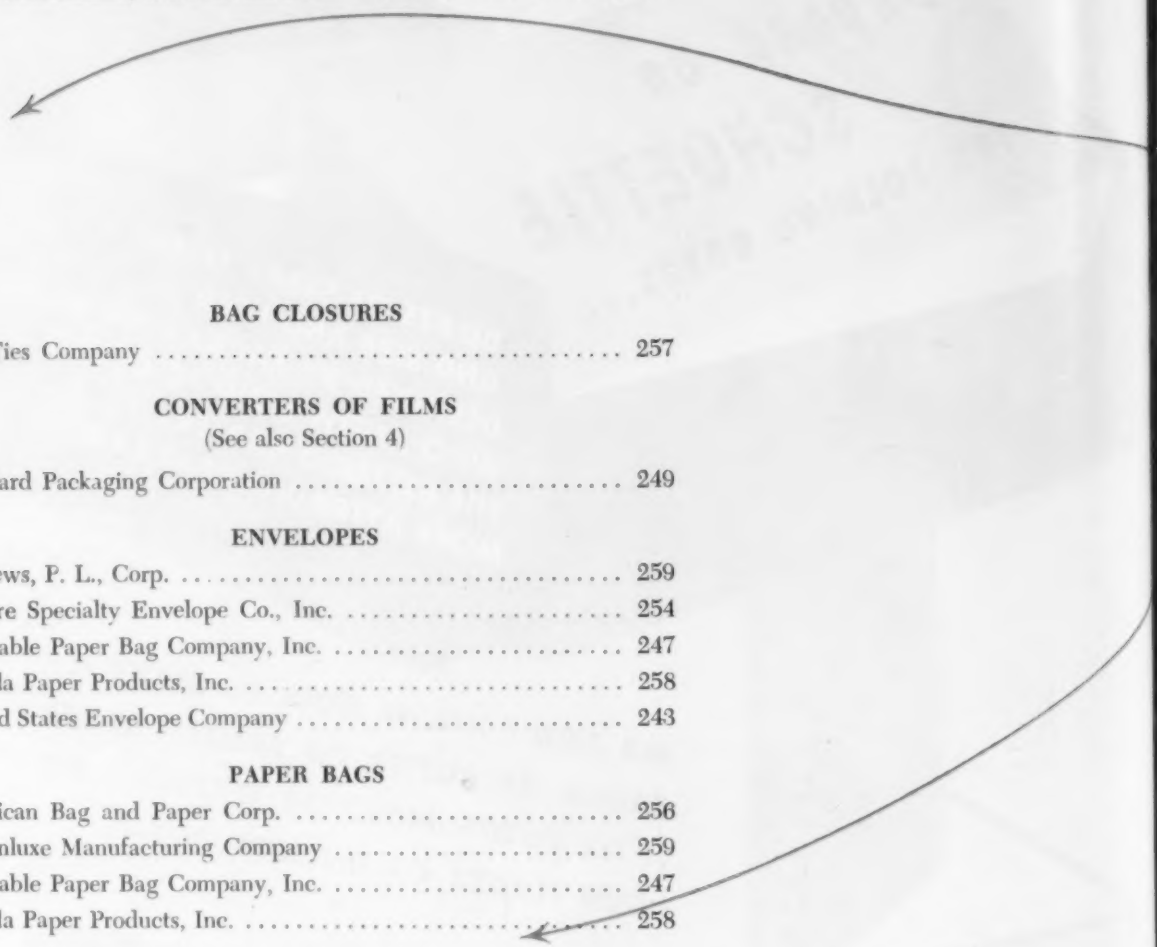
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WE DON'T KNOW HOW TO MAKE ICE CREAM OR BUTTER OR FROZEN BEANS ...OR TOOTH-PICKS OR OATMEAL OR CORN FLAKES OR BISCUITS, BUT—
WE SURE KNOW HOW TO MAKE FOLDING BOXES FOR THEM—WAXED OR PLAIN—THAT PROTECT BETTER, ATTRACT BETTER, SELL BETTER!
Write, wire or phone... a consultation involves no obligation!
EDWIN J. SCHOETTLE CO. INC.
533 NORTH ELEVENTH STREET, PHILADELPHIA 23, PENNA.
Designers and Manufacturers of Paper Boxes with Buy Appeal!

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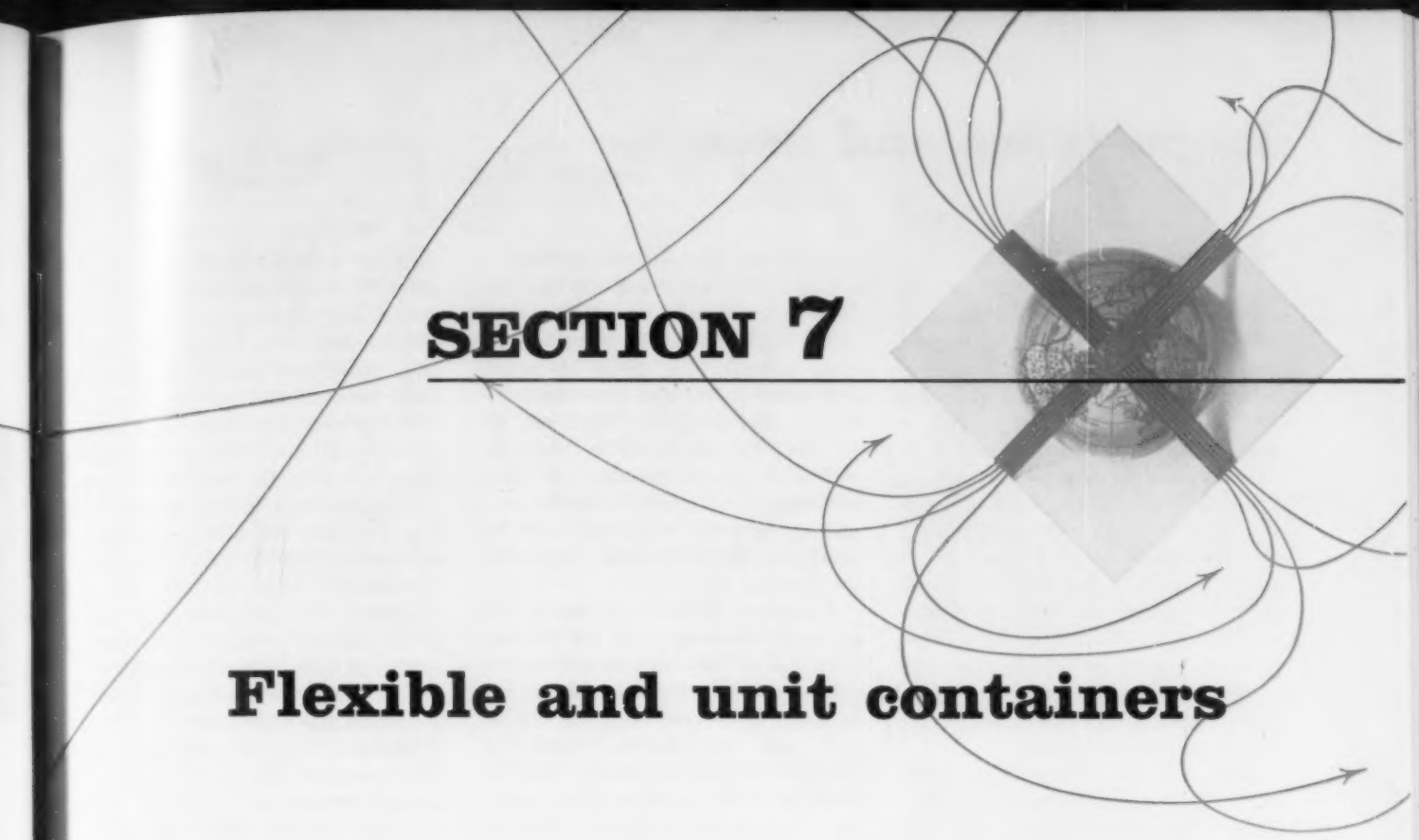
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Flexible and unit containers

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Bags—types and uses

by STANLEY H. OSHAN*

The style of bag to be selected for any particular packaging project will depend on the physical shape or contour of the product to be packed and the appearance you wish to achieve with your finished package. For example, if you are packing a flat or disk-shaped product and wish to emphasize its biggest dimensions, you may decide upon a flat bag, since this type has no side gussets and therefore gives an impression of expansiveness. On the other hand, if your product has depth and you wish to enhance its three-dimensional appearance, in all probability you will prefer a square bag, since this gives you the side gussets necessary to accommodate product depth.

Both flat and square bags come with an elliptical sheer-cut or fine-serrated lip, although this contour can be modified or altered within reasonable ranges. A flat bag, that is, without side gussets, may also have a satchel (hexagonal) bottom for the purpose of providing a foundation for the package. This construction permits standing the finished package on end. A square bag may likewise be obtained with an expansion bottom, that is, automatic self-opening. This is a popular construction for free-flowing commodities because, when filled, it squares off much like a box and can be readily stacked.

All bag styles can be manufactured from virtually any grade of paper, and many styles from film and laminations including foil. Moreover, all of them can be made in single or multiwall grades. Because of their construction, simplicity, and the ease and speed with which they can be fabricated, flat and square bags offer the greatest economy.

Economy, of course, is one of the principal advantages to be derived from the use of a flexible container—economy not alone in original cost but in terms of reduced shipping weight and space conservation. Since the average supermarket stocks close to 4,000 products, a space-saving package is not an inconsiderable factor in dealer acceptance.

Material

There is no doubt as to the ability of a paper bag to do a superior packaging job. It can be made to withstand repeated handling. It will display readily. It can be designed for outstanding merchandise appeal. It can hold free-flowing materials, solids or liquids. It can be made impermeable to light, gas, odor, water, water vapor, grease and oil. It will function well on automatic packaging equipment. It will resist temperature extremes and guard against damage.

Now, too, it is possible to obtain bags made from paper materials that have been treated for wet strength. Many grocery bags and various types of single and multiwall sacks are made from wet-strength kraft. Here again the supermarket makes its influence felt. Produces departments in supermarkets are prolific users of bleached wet-strength bags, with or without windows, for pre-packaging citrus fruits, onions, potatoes, etc. Various grades of kraft coated with polyethylene are used for packaging dry ice, chemicals and insecticides.

Materials such as cellophane, acetate, aluminum foil, saran, vinyl, nonwoven rayons and cottons, scrim, polyethylene and combinations thereof have become freely available within the relatively recent past and have done much to expand packaging possibilities for many a product. Each of these materials is endowed with certain protective characteristics and it is possible to laminate them to basic grades of paper like kraft, sulphite, glassine and parchment to provide a combination of properties to satisfy almost any packaging problem.

By the further addition of a coating or lacquer that may itself be tailored

* Oneida Paper Products, Inc., Clifton, N. J.



PHOTO COURTESY ONEIDA PAPER PRODUCTS, INC.

Printed cellophane bags greatly increase the efficiency of packaging and merchandising fresh produce—branded product is cleaner and easier to buy and use.



PHOTO COURTESY ARNOLD & ABORN

Coffee bag is a standard type because of its proved merits.

to the demands of the product being packaged, a packaging material can be fabricated in the form of a bag that will effectively compensate for the physical or chemical instability of the commodity being packed. In short, flexible packaging can be formulated to order, in accordance with the requirements of the product to be packaged. Indicative of the packaging potential of flexible materials is the application of specialty bags to packing under vacuum or the packing in coated transparent bags of such commodities as citrus juices.

Adhesive manufacturers and packaging-equipment companies have kept pace with flexible packaging materials and, as a result, virtually every product produced by specialty bag converters can be handled efficiently on a production-line basis. Inert, free-folding textiles are now being packaged in polyethylene, Pliofilm and cellophane on automatic equipment.

Bags have been made that are treated with a vapor corrosion inhibitor to protect products from corrosion. In the anti-tarnish paper group you can find one that will safeguard the luster and brilliancy of susceptible articles by eliminating oxidation.

A new packaging development is the glassine bag which extends the life of potato chips and affords a greater degree of strength to the package—by the application of 6 lb. of wax instead of the conventional 3 lb., using a suction-bond adhesive and a stronger base stock.

Another development is the partitioned cellophane bags in use for combination put-ups of pretzels, potato chips and popcorn.

A compartmented polyethylene bag also has appeared as a package for a shoe brush and shoe buffer, suggesting possibilities for this type of "set" or kit packaging for hardware, etc.

Improvements in bag manufacturing and in packaging machine methods and procedures, as well as the availability of barrier coatings and films, now make it possible to obtain a flexible package that will:

1. Keep merchandise dry or moist
2. Retard rancidity
3. Afford wet strength
4. Inhibit grease penetration
5. Hold product flavors and aromas
6. Resist extremes of temperature
7. Minimize breakage
8. Prevent sifting
9. Guard against light penetration
10. Machine efficiently on converting and packaging equipment.

Because many technical factors may be involved, it is always a safe procedure for the packer to consult with a reputable producer of flexible packaging materials when he is thinking of marketing a new product.

Moreover, it is advisable to consider the bumpy distributional highway that a flexible package travels before arriving at point of consumption in the household, for, by so doing, we can assess and predetermine package specifications. Basically, this is the distributional pattern: (1) manu-

PHOTO COURTESY CONTINENTAL CAN CO.



These siftproof bags employ double-kraft construction; heat-seal tops.

PHOTO COURTESY MILPRINT, INC.



This efficient polyethylene bag produced a 35% gain in multi-unit sales.

BAG DESIGN, DOBECKMUN CO.



Convenient triple-pack for popcorn and oil uses bag made from cellophane and polyethylene-coated cellophane.



Attractive carry-home bags merchandise odd-shaped items; promote customer convenience and good will.

facturer, (2) distributor, (3) jobber and/or dealer, (4) warehouse, (5) store clerk, (6) shopper, (7) check-out counter, (8) take-home, (9) shelf or refrigerator and (10) repeated end use. It is a tribute to the paper maker, as well as the flexible-package manufacturer and the packager, that bags are able to survive this handling.

Closure

Since a flexible package is no better nor worse than the means used to close or seal it, obviously closures and closing procedures are critically important. A variety of closures and closing methods in current uses includes heat sealing, metal ties, drawstrings, gluing, staples, gummed tape, stitching, clips and pressure-sensitive tape. Recently a new type of vinyl-covered wire tie has been introduced which is designed to give tight closure and reclosure with a single twist.

Heat sealing is by far the most popular method of closure. Heat-seal bags can be easily and economically produced by most bag manufacturers and they lend themselves well to efficient packaging operations. A heat-seal closure does not, of course, afford the convenience of repeated opening and closing, as do metal ties, drawstrings and the like. But if the product to be packaged is migratory or unstable in character, or if reclosure is not required, the use of a heat seal is suggested. It has the advantage of being virtually tamperproof—an important consideration in any package intended for self service.

End uses and trends

The supermarket has so influenced retailing practices that self-service operations are now in evidence in drug, hardware, syndicate and department stores. With this revolution in retailing procedures there has come a comparable revolution in packaging techniques. A visit through the average supermarket will reveal flexible packaging of a wide variety of products, including free-flowing liquids like soy sauce, combinations such as a duplex package of popcorn and oil, "semiliquids" like dessert toppings, and all kinds of solid products.

It is significant that much pre-packaging is being done right at store level, one of the largest developments being the pre-packaging of fresh fruits and vegetables in numerous kinds of bags. Packaging at the retail level minimizes the dangers ordinarily confronting packages in transit.

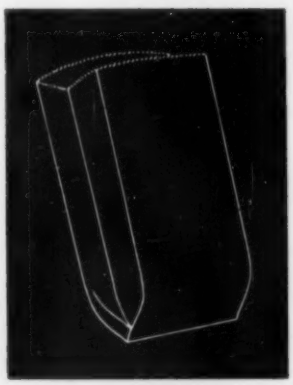
Marked advancement has been made in the flexible packaging of highly sensitive products like potato chips, which now enjoy a far longer shelf life protected from the destructive attacks of moisture and light rays. The efficient processing of inert films, such as polyethylene, has also opened the door to new uses.

BAG CONSTRUCTIONS—BASIC TYPES

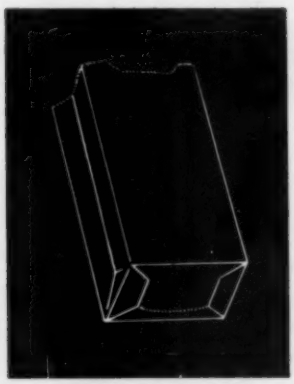
Flat bag **is simple in construction, formed from a lengthwise-seamed tube, cut to size, with the bottom folded and pasted.** ***Square bag*** **offers larger capacity because of side gussets, or bellows.** ***Automatic bag*** **makes a square, self-opening, self-standing package. Generally duplex, it combines basic features of other types.** ***Satchel-bottom bag*** **has a flat-style body, hexagonal-shaped bottom. This is the only self-standing square-bottom bag that can be constructed from transparent films.** ***Full-face window bag*** **combines either kraft or glassine and cellophane, offering stability and visibility.** ***Crimp-bottom bag*** **is flat or square, generally duplex, cellophane, with a folded, heat-sealed and crimped bottom.** ***Full-strip window bag*** **has lengthwise cellophane window, giving good visibility.** ***Die-cut window bag*** **has cellophane opening to offer partial visibility.**



Flat bag



Square bag



Automatic bag



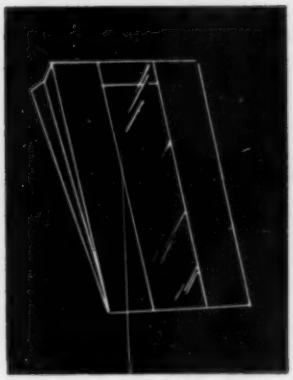
Satchel-bottom bag



Full-face window bag



Crimp-bottom bag



Full-strip window bag



Die-cut window bag

DRAWINGS COURTESY ONEIDA PAPER PRODUCTS, INC.

A Few of the many

U.S.E. Standard and Special Containers for your Modern Packaging Needs



View-Pac Flat Containers

Made of transparent materials, View-Pac style is stocked in 22 sizes of No. 300 Plain Transparent Cellophane and made in other sizes and materials to order.



Quik-Serv® Envelopes

The perfect package for powdered or granulated foods, drugs, powders, tablets or tiny pills. A patented specialty envelope for easy filling and quick opening. A "shaker" feature for gradual dispensing may be built in. Made to order.



Safety-Fold Style

A portion of the body is folded over to form part of top and bottom flaps giving an envelope completely enclosed at all corners. Ideal for items requiring secure seals without chance of leakage.



Open Side and Open End Envelopes

Popular for simple packaging operations where ordinary protection is sufficient. Easily filled; gummed flap seals securely. Stocked in many sizes and made to order in any size.



Glassine or Cellophane Die Cut Containers

Very popular with packers of candies, nuts and other small items. Keeps the product fresh and clean yet permits the buyer to observe the contents. Open end for easy filling. Twenty stock sizes with specials made to order.



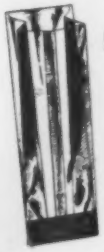
E-Z Pac Flat Containers

Supplied in moisture-proof, heat-sealing transparent material in a wide range of sizes. Easy to fill, quick to seal — the contents are always fresh and appealing. Stocked in cellophane in 2 sizes — 3" x 3¾" and 3" x 5½", widely used for the packaging of nuts.



Printed Film or Paper

Cellophane, Acetate, Pliofilm, Polyethylene, Glassine and Laminated Paper, printed in widths up to 30 inches. Gravure and Flexographic, with precision required for photo-electric controls. Also design facilities.



E-Z Pac Expansion Containers

Made to serve a variety of industries where bulk may require an expansion container. It protects the products yet brings them into clear view of the buyer. An economical transparent bag. May be heat-sealed if desired. Many weights and sizes.



Two-Piece Display Pac Container

A special purpose container designed to give its contents maximum display at minimum cost. Made by putting together two pieces of material, one transparent or translucent, the other translucent or opaque. Completely sealed by adhesives or heat. Made to order.



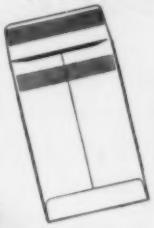
Protective Cushion Envelopes

Laminated padding with plain or decorated paper forms envelope container with cushioning properties. Ideal for use in optical, plastic, jewelry and polished metal industries. Can be printed. Sizes on request.



Utility Envelopes

Used extensively as counter envelopes by makers of hosiery, lingerie, cosmetics and other impulse-bought merchandise. The two-side-seam construction allows wide areas front and back, unbroken by seams, on which to print attractive designs, attention-compelling displays.



Self-Seal® Open End Envelopes

A line of containers patented by the United States Envelope Company that offers savings up to 50% in packing due to the ease and speed of sealing. No licking, no moistening — just press down the flap to seal. Ideal for thousands of items such as souvenirs, patterns, repair kits, etc.



Columbian® Snap Envelopes

Where the envelope will be opened and closed many times this recent U.S.E. development with its Snap Fastener feature makes an ideal container. Such items as drills, keys, hardware fixtures and other small parts are now so packaged. Has unlimited possibilities as can be applied to any envelope size or type.



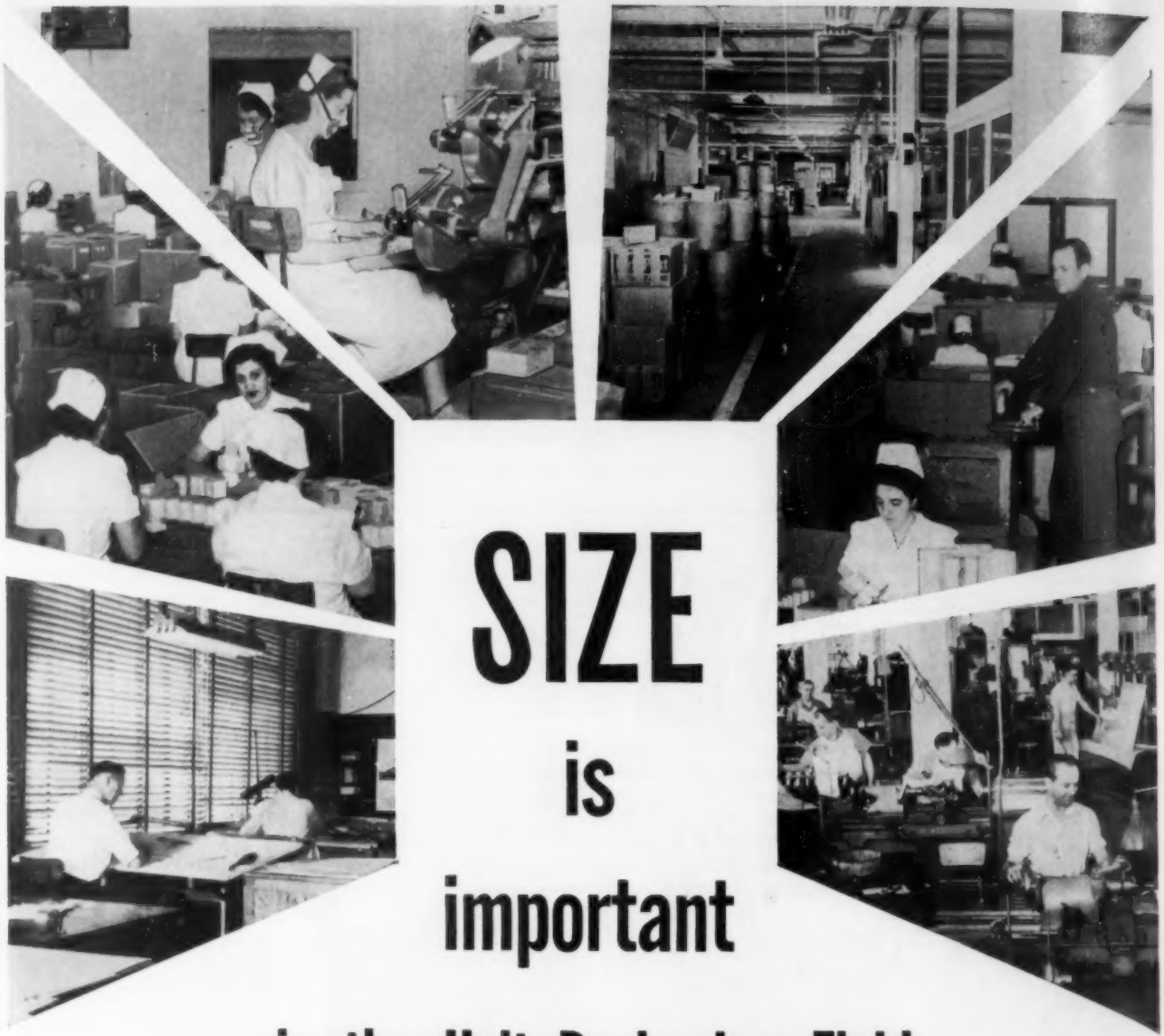
Illustrated and described here are some of the more commonly used types of U.S.E. Flexible Containers. There are many more to choose from in both standard and special sizes. The United States Envelope Company can not only supply you with just the right package, but it is also equipped to add eye-catching appeal to any container through printing your message or designs on the package. Letterpress or lithography, one color to four — the printing is done rapidly, skillfully and economically.

For the complete story on U.S.E. Flexible Containers write for a copy of the "Handbook of Envelope Products and Purposes" shown on the left. It's FREE. And it is a book to which you will refer again and again.

UNITED STATES ENVELOPE COMPANY

SPRINGFIELD 2, MASSACHUSETTS

15 Divisions from Coast to Coast



SIZE is important in the Unit-Packaging Field

Size denotes the success which can only come from reliability and service through the years. For business growth is most certainly dependent upon ability, progress and satisfied customers.

Ivers-Lee has shown steady growth during its 35 year history . . . and numbers among its fine customers many whom we have served over this entire period.

Because of this unequaled size, Ivers-Lee has the capacity to deliver as many as 15,000,000 units every 8 hour shift from its 2 plants and almost 200 high-speed packaging machines.

IVERS LEE CO.
215 CENTRAL AVENUE NEWARK, NEW JERSEY
UNIT PACKAGING

CREATORS OF A THOUSAND AND ONE DIFFERENT TYPES OF UNIT-PACKAGES

for tablets, capsules, triturates, powders, liquids, creams and unusual products during 35 years of Packaging Service.

Envelopes and packets

by JOHN M. COWAN*

Envelopes and packets serve many product fields. They provide an extremely wide range of protective and merchandising features and, in general, are one of the most economical package forms.

The terminology regarding envelopes, packets and pouches is sometimes used loosely and interchangeably. For purposes of this article, *envelopes or flat bags* are pre-formed flat containers made of flexible materials with one edge or end open. They are generally intended for use in packaging lines that are not fully automatic or highly mechanized.

Packets or pouches, on the other hand, are generally formed as part of the packaging-line operation on automatic machinery that feeds the flexible pouch material from a roll. Three forming methods are in common use: The first involves a single web, combined in the back with a longitudinal seal. The second method takes a single web, folds it in half and seals both side edges. A third method employs two webs which are sealed on three edges. In each method a final seal must be made for closure of the packet or pouch. (See "Pouch Formers, Fillers, Sealers," p. 470.)

Envelopes or flat bags are available in many sizes and materials. The opening may be cut flush or it may have a flap or a lip which is usually heat sealed or glued or stapled after filling. The tops are sometimes folded over and closed by a stapled or heat-sealed printed paper label.

In size, envelopes vary from tiny ⅜-by-1-in. envelopes with a center seam for watch parts to 7½ by 10½-in., or larger.

Particular types of envelopes are made for special product fields—sift-proof envelopes for seeds, flat envelopes for hand-packed bacon, transparent envelopes for wearing apparel such as slips, blouses and hosiery.

The packet or pouch container, which generally is intended for relatively high-volume mass-distribution merchandise, is an extremely versatile container, effectively used for candies, salted peanuts, pills, hardware or machine parts, soup mixes and for liquid-packed or liquid products including pickles, sauerkraut, French dressing, permanent-wave solution.

The packet or pouch derives many of its special advantages from the fact that a very wide range of materials can be employed. Papers, films and foils, singly or in combination, can be used to provide tailored-to-fit protection, transparency and merchandising design. The number of practical combination materials—polyethylene-coated cellophane or laminated polyethylene to cellophane; acetate-foil-polyethylene, etc.—has been increasing to the extent that packagers can expect to use packets with greater success and for more products than ever before. (See Section 3, "Basic Packaging Papers," p. 52, and Section 4, "Laminated Materials," p. 138.)

Envelopes and packets offer excellent opportunity for attractive printing to add individual decoration, identity of product and manufacturer, instructions for use and price spots. Where a laminate is employed and the outer laminant is a transparent material, printing of the reverse side is naturally suggested so that the printing is "locked in" and permanently protected. This reverse-printed method has the additional advantage of giving a high luster to the printing.

One of the comparatively recent trends in pouch packaging involves the drawing of a vacuum in the container during the sealing operation. The vacuum process employing evacuated, transparent flexible containers is designed to afford protection formerly obtainable only in rigid containers. Perishables such as sliced luncheon meats, ham, frankfurters, bacon, smoked fish, pickles and sauerkraut can be successfully and attractively packaged in an air-evacuated pouch to assure retention of flavor and color and a longer shelf life. A variation in

*Managing Director, National Flexible Packaging Assn., Cleveland, Ohio.

PHOTO COURTESY STECHER-TRAUNG LITHOGRAPH CORP.



New idea for vegetable seed packets is use of appetite-appeal illustrations featuring mouth-watering realism.

PHOTO COURTESY STANDARD PACKAGING CORP.



Sliced cheese is nitrogen packed in laminated cellophane-polyethylene packet for visibility plus longer shelf life.

PHOTO COURTESY FLEXIGRIP, INC.



Transparent polyethylene envelope for a cashmere sweater has a plastic zipper. The visibility package is handy for storage and travel; it is dustproof and mothproof.

PHOTO COURTESY U. S. ENVELOPE CO.



Protective cushion envelope for glasses, cammera lenses and similar delicate-surface items has an inner padding laminated to plain or decorative paper as required.

the vacuum processing of flexible packages provides for the introduction of an inert and protective atmosphere such as nitrogen or carbon dioxide. The "substitute atmosphere" makes for an aesthetically better-looking package and is recommended for soft foods, such as sliced cheese or dried fruits, that cohere when subjected to the pressures produced by the air surrounding a vacuum package. The atmosphere of inert gas within the package prevents cohesion of soft or sticky products because it equalizes inner and outer pressures.

An interesting vacuum-pouch application is in the packaging of hosiery. The purpose of the vacuum is to hold the stockings in place and prevent wrinkled, unsightly packs.

British packagers are using the vacuum process to produce an extremely solid "brick-hard" film package.

Improvements in laminated and coated materials are also extending the potentials for vacuum-packed flexible containers. Laminations of Pliofilm and cellophane are the most commonly used types of material for the vacuum pouch. Saran has also proved excellent and certain foil combinations have been used. Now "Mylar"-polyethylene and "Mylar"-vinyl combinations loom importantly on the horizon.

Two developments akin to vacuum packaging are (1) the use of a mechanically flattened pouch and (2) the employment of an air-sealed flexible container. The flattened package is produced by heat-sealing equipment incorporating a soft conforming blanket that presses out excess air when the bag is sealed. This machinery reportedly is being used only on pre-fabricated bags, but the principle possibly could be incorporated in automatic equipment.

The air-sealed flexible container, as used by a marshmallow packager,[1] employs a colorfully printed re-usable 2-mil polyethylene envelope. The air sealed in the package acts as a cushion, preventing damage to the candy.

Envelopes and packets are finding increasing applications in industrial packaging, especially in the handling of parts and unit assemblies. Various barrier properties, offering protection against moisture, corrosion, grease, etc., can be specified. The container lends itself to effective marking for identification and inventory control and, where a transparent package is used, employees can more readily select correct assemblies.

The manufacturer who is contemplating the selection of an envelope or pouch is faced with a variety of possible approaches.

If the volume anticipated is substantial, maximum mechanization is desirable. If the product is a new one, with an unknown rate of growth ahead of it, then an approach that keeps the initial investment small and permits changes and refinements may be more desirable.

Of course large volume does not preclude the pre-fabricated construction, nor does the pouch or packet necessarily imply automatic high-speed packaging. But the pouch is generally associated with large-scale packaging in view of the fully automatic forming, filling and sealing.

PHOTO COURTESY DOBECKMUN CO.



Unit packets are an increasingly popular package form. These packets for plant food are made of foil and acetate with inner heat-sealing surface and are reverse printed. This type of compact, excellent handling, excellent selling, extra protective pack is modern in every sense.

[1] See "Air-Cushion Pack," MODERN PACKAGING, July, 1953, p. 100.



SHOPPING BAGS

BAGORAMA

EQUITABLE presents

The Biggest Show in Bag Packaging!

Paper and polyethylene merchandise bags . . . heavy-duty shipping sacks . . . colorful shopping bags . . . record sleeves . . . catalog envelopes . . . Equitable manufactures the largest variety of bag products. In fact Equitable is equipped to supply bags from *4 inches to 14 feet* long!

In addition to variety, Equitable also offers you *quality*. From start to finish, each order is supervised by Equitable's quality-control laboratory. Paper and film, adhesives, printing inks and finished bags undergo constant testing to assure the highest standard of quality.

Remember . . . there is no package more economical than a bag. Whatever your needs, be sure to contact Equitable for the best in bag packaging. Write *today* for samples and prices.

Equitable
PAPER BAG COMPANY INC.

45-50 VAN DAM STREET, LONG ISLAND CITY 1, N. Y. • Telephone: STillwell 4-4900

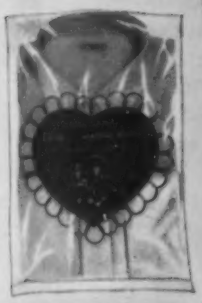
Warehouses in:
LONG ISLAND CITY, N. Y. • BUFFALO, N. Y. • PITTSBURGH, PA. • COLUMBUS, O.
CHICAGO, ILL. • KANSAS CITY, MO. • CHARLOTTE, N. C. • TAMPA, FLA.
NEW ORLEANS, LA. • ORANGE, TEX.



MERCHANDISE BAGS



MULTIWALL BAGS



EQUITHENE POLYETHYLENE



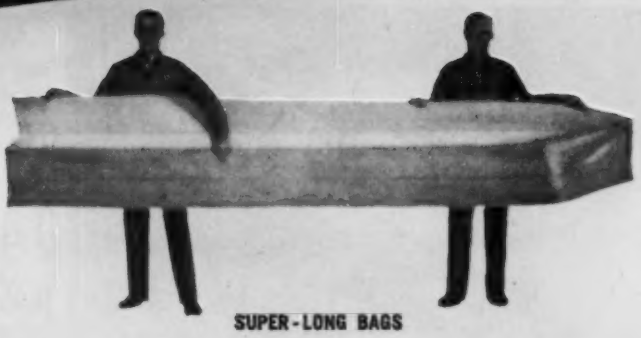
RECORD SLEEVES



TAKE HOLD HANDLE



ENVELOPES



SUPER-LONG BAGS

Unit and strip packaging



PHOTO COURTESY RIEGEL PAPER CORP.

Pouch with just enough mix for three pancakes speeds restaurant service.



Strip-packaged grease fittings, each heat sealed in a polyethylene-cellophane pouch are dispensed from a reel holding 100 units.

Unit packaging is perhaps best thought of as a technique or method that seeks to capitalize on the buying public's already great and growing love of convenience. The unit package offers convenience because it is specifically designed as a unit-of-use package, that is, it contains a quantity sufficient for a single portion, dosage or mixing. The customer is therefore assured of a measured quantity sufficient to meet a specific need, a quantity protected in an unopened package right up to the time of use.

Strip packaging, as the name implies, is simply a number of unit packages, formed from a web stock and not cut or separated into individual packages, because they offer certain merchandising or dispensing advantages as a strip of packages.

The unit package in principle is closely allied to the successful technique known as fractional packaging and the strip package is related in principle to multiple packaging.

Unit packaging as a method is not new. The single-service cube of sugar is a unit-of-use package. So is the tea bag, the capsule and so also have been many products packaged in cartons, one-shot collapsible tubes and other package forms.

However, it is the packet or pouch —formed, filled and closed at high speed—that has offered the packager whole new fields to conquer from the standpoint of unit- and strip-packaging convenience.

Pioneering in the technique of using unit packages for drugs and foods just prior to and during World War II opened the way for the huge program of unit, individually packed emergency rations. Since that time developments in materials and equipment have continued. Meanwhile the pressures of self-service and robot selling have widened the demand for convenience packages and packagers have been learning how to improve application of the principles and objectives of unit and strip packaging.

Actually the surface may only have been scratched. The opportunities for employing unit-of-use packets in retail, institutional and industrial-type packaging are seemingly inexhaustible. Packets containing measured quantities are naturally suggested where mixing or batching is involved. Examples include dehydrated products to be reconstituted as liquids, put-ups of coffee for the coffee maker, soap for the wash tub, chemicals for industrial batching, etc. Pharmaceutical products lend themselves especially well to unit packaging and many notable single-dose packages have been developed. Food products, such as toppings, salad dressing, jellies, sauerkraut, herrings and pickles have

PHOTO COURTESY THE WILLIAM STEVEN CO.



Merchandising potential of strip package is shown by this appealing Western movie reel of candy.

PHOTO COURTESY IVERS-LEE CO.



Unit packs lend themselves to new and effective design treatments — as in unit for cough syrup.



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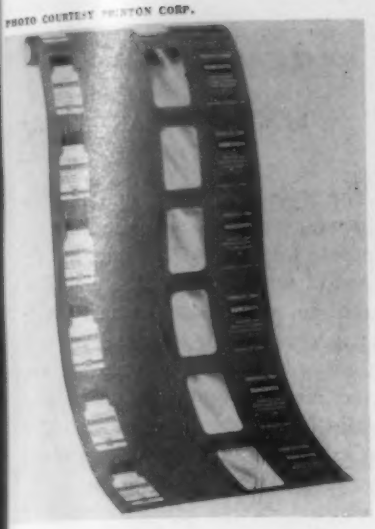
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PHOTO COURTESY TRENTON CORP.



Laminated pouch stock combines gravure printing and "window" areas of transparent film. Product is heat sealed under transparent area.

PHOTO COURTESY BAKELITE CO.



Formed vinyl cups package individual ½-oz. portions of jams and jellies. The product is ready to serve, fresh, sanitary.

scored important merchandising gains in single-service packets. Sampling is still another field.

The packaging of liquids in flexible packets is now rated one of the most promising avenues of growth for the unit package. Packets for liquids offer intriguing possibilities for design and novelty appeal. It is advisable, for leakproofness, to make the sealed circumference extra wide and restrict the liquid to a center area, thus providing an opportunity to design sealing dies that will form the product area into a variety of shapes—a bottle, pitcher, tube, etc.

One authority on unit packaging predicts that many single-use liquid and semiliquid products now in conventional containers (bottles and cans) will one day be packaged in laminated flexible packages at one-half to one-third the cost. Leakage need not necessarily be a hazard. Properly formed and sealed packets have already demonstrated the reliability of their protective qualities. Moreover, the unconventional appearance of the flexible liquid pack does not have to be a drawback; instead, the design potentials can be converted into a strong merchandising asset.

The manufacturer who decides to unit package his product as a regular sales package or as a sample has two choices. He can purchase any one of a number of standard machines[1] and do the packaging in his own plant, or he can turn over the product to a contract packager[2] who will help select the material and run it.

Where existing machines will not handle a particular job, modifications often can be made and special-purpose machines are more and more being successfully engineered.

Strip packaging, as previously mentioned, is unit packaging with the units connected for a special purpose. Few packages are more dramatic and functional in the interest of both manufacturer and user than a properly adapted strip package. In a competitive field a strip package can be the decisive plus in merchandising a product. For delivering the product in attractive packages adequately protected is not always enough today. The thoughtful manufacturer knows that an easy-to-use package is used more frequently and is preferred to nonfunctional competing packages; both points result in proportionate sales increases. This trend in modern packaging has forced a maturing of the new, specialized field known as unit packaging. Lower production costs and better dispensing for the user often result when these unit or measured-dosage packages remain connected to form a chain or strip.

Strip packaging is indicated in preference to severed units only when connected packages serve a special purpose. In addition, the specific use for which the strip package is planned must promise sufficient volume.

Investigation of strip packaging's potential should be especially rewarding in regard to (1) grouping of multiple units or related items to make the product easier to use; (2) advantageous dispensing in a roll, strip or from a carton magazine; (3) effective merchandising display; (4) novelty appeal, and (5) shipment of fragile items suspended in strips and anchored in the shipper. Strip packaging can feature one or all of these.

PHOTO COURTESY AVISCO



Individual service of sugar, spoon and napkin is automatically filled and heat sealed in cellophane.

PHOTO COURTESY THE DOEBCKMUN CO.



Cellophane-wrapped tray holds four foil-acetate tablet packages. Tear strip is for easy opening.

[1] The reader is referred to the Machinery and Equipment Section of the Buyers' Directory at the end of this volume for names of firms supplying this type of equipment.

[2] See list of Contract Packagers in the Buyers' Directory at the end of this volume.

Wraps—materials, methods and uses

by W. B. BRONANDER, JR.*

Many products, because of their softness, irregular shape or for various production or merchandising reasons, find the individual wrap a practical package form. Economy in the use of materials and light weight are special features of this type of packaging. The protection afforded is excellent, especially considering the softness and fragility of many of the products that now successfully go to market in wraps. In addition, many merchandising advantages accrue.

Highly developed printed or transparent wraps are standard for the packaging of bread, candy, cigarettes, butter and a host of cartoned commodities, such as crackers, cereals and razor blades. In addition, a long-accepted type of siftproof wrap called the "tight wrap" is used on cartons containing products like cake mixes.

In recent years, wraps have scored important advances in the packaging of textiles, fresh produce, meats and other products. Wraps are ideal for visibility packaging—especially important in the pre-packaging field—and, combined with suitable paperboard forms, permit machine wrapping of irregular-shaped packages.

Wraps fall into three classifications, according to function: (1) single wraps, like those for bologna or cheese, which form the only protection for the product at the retail level; (2) overwraps, like the outer paper or cellophane sheathing for boxed cookies, and (3) the unit wrap within the package, such as the individual wrap for adhesive strip bandages, razor blades or cube sugar. There are also many types of combination of unit wraps and overwraps.

The style of package and the flexible wrapping materials used are important factors in determining the speed of wrapping and the right machine. In some cases a small dimensional change in the package will permit adoption of a standard machine and equipment manufacturers should be consulted before determining a new design. (See "Wrapping and Bundling Machines," p. 454.)

Closure. Wraps can be secured by a number of methods—gluing, heat sealing, banding, stapling or taping. Gluing is the common method of sealing paper wraps. Heat sealing is almost universal with transparent films because it helps preserve the basic properties of the wrap, particularly the characteristics that afford protection against moisture, water or air.

Opening tape is now found on all but a few cigarette packages as well as many of the leading cough-drop and candy cartons. There are, of course, many other successful applications of machine-applied easy-opening devices for wrap packages and new ones are continually being developed.

Types of wraps

In view of the special requirements involved in wrapping various types of products, machinery has been developed for specific industries, and processes and materials follow broad traditional patterns.

Bakery products. Despite the fragility of bakery items, wraps are an

* Scandia Mfg. Co., North Arlington, N. J.

PHOTO COURTESY AVISCO



Cellophane wrap for cauliflower has attached strips of foil that provide a twist closure. Reportedly, freight costs are lowered; shelf life, doubled; sales increased.

PHOTO COURTESY MELPRINT, INC.



Cellophane wraps for these sliced, round loaves are applied automatically—30 loaves a minute.

PHOTO COURTESY NASHUA CORP.



Full-color illustrations of a sandwich and toast convert a "commodity package" into a tempting end-use ad.

accepted type of packaging for bread, cup cakes, cookies, snack packs, etc. The sheer economy of the waxed-paper wrap for bread makes it ideal for this perishable staple.

Specialty breads, cup cakes and cookies are generally wrapped in transparent film, which at the same time stimulates impulse buying and keeps the product fresh and sanitary. Sometimes white and whole-wheat or other types of bread are wrapped automatically in a duplex pack, half the slices of one type and half of another. Since visibility is at a premium where transparent wraps are used, bands, thermoplastic spot labels or printing directly on the film provide identification and decoration.

PHOTO COURTESY THE DOBECKMUN CO.



Standard package for chewing gum consists of individual stick wrappers and outer wrap of cellophane. Tear strip assures opening convenience.

Confections. Individual and combination wraps are widely used in confectionery packaging. Where demand is large, specially designed single-purpose machinery is available for wrapping lollipops, hard or soft candy pieces (twist wrap), round goods such as chocolate mint patties, and cylindrical items such as rolls of hard candies. Chocolates and other candies as well are susceptible to odor contamination and must also be protected against flavor loss. Foils, special papers, and films and laminations of these are therefore commonly used.

Dairy products. Parchment wraps are an accepted material for print butter, lard, margarine and other fatty products. Foil laminated to parchment provides an excellent wrap, especially for high-score butter, where protection against flavor loss and odor contamination is of first importance. Wraps for cheese are now standard practice, with the result that the bulk-displayed product is a rarity in most retail outlets. Transparent wraps such as cellophane, Pliofilm and saran are popular.

Tobacco. Cellophane overwraps are standard in the packaging of cigarettes and cigars.

Pre-packaging. Transparent film is the packaging material most widely used in this field and numerous films are available to meet specific requirements—for example, to keep moisture in or out of the package or to permit the product to breathe. The list of items pre-packaged in film wraps is a long one, including tomatoes, lettuce, celery, corn, fruits and meats.

Frozen foods are important users of carton overwraps, which are especially effective because they provide excellent surfaces for labeling. Whether the overwrap be a coated paper, cellophane or some other material, colorful labeling and high-fidelity reproduction are essential because of the demand made on frozen-food packages to stress appetite appeal and to help offset the display limitations of freezer-cabinet storage.

One advance noted in frozen-food wraps has been the improved performance of waxed-paper wraps employing polyethylene resin in the coating. The polyethylene helps prevent sticking at icy temperatures, increases resistance to scuff and rub-off and heightens gloss and color.

Textiles. Attractive unitizing, strong brand selling and the advantages of factory-fresh goods have intensified the popularity of wrapped linens and clothing. The introduction and spread of self-service techniques in low-price variety and supermarket outlets has increased the need for all kinds of unitized soft goods, so that practically every manufacturer in these lines has already faced the problem of brand packaging his wares in retail put-ups.

For linens of all kinds, particularly

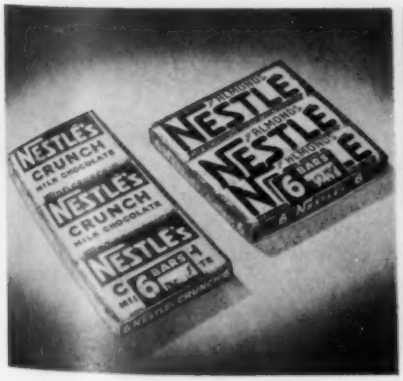




PHOTO COURTESY SHELLMAR-BETNER



Tray and overwrap converts individually wrapped candy bars into a multiple-unit or family-size package. Multiple-unit package is a better package for supermarkets to handle. The overwrapped cereal combination also gives stores a larger unit of sale. Shoppers like it, too, because it provides variety. Bulbs and similar garden products find the tray and printed overwrap an important merchandising medium because they stimulate self-service buying.



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Foil wrappers for soap are in the news because they capitalize on foil's gleaming appearance.

sheets and pillow cases, clear film is used, but lines of clothing like children's socks, men's shorts and swimsuits, women's underwear and blouses are being wrapped in tamperproof packages, with quality brand marking, size and price notations and even instructions for laundering and care.

Special-occasion wraps

Wraps readily lend themselves to the important merchandising task of dressing up products and packages for special promotions—Christmas, Easter, Mother's Day and the like. Frequently, this is done merely by overwrapping or banding the year-round or regular package with an appropriate wrap or band. In addition to the private designs that may be created, a wide selection of stock designs is available. Many are printed on transparent film to permit the brand and product identification on the regular package to show through.

Candy and tobacco are big users of special-occasion wraps, but the technique is applicable to any product or package that lends itself to wrapping methods and special promotions. An important advantage of overwrapping the regular package is that the special-occasion wrap can be removed when the holiday is past, converting the package back to regular stock.

Trends

Wraps have a basic place in the packaging picture, but the field is dynamic. Supermarkets have influenced the packaging of many small items—hardware, foods and household products. To attract bargain-seeking customers and prevent pilferage, a modified form of bundling known as multiple packaging has been introduced. Five to 10 candy bars or chewing-gum packages are wrapped as a unit on redesigned, standard-type machines. Flat cards, U boards and trays are specified, depending upon the

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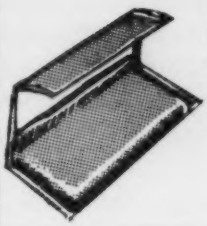
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KANGAROO POUCH



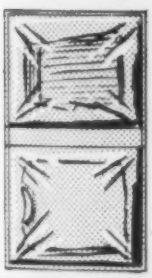
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Printability of overwrap materials is an asset which gives products in frozen-food cabinets a competitive edge.

product and the machine used. Special machines have also been developed to produce multiple wraps for various products. Bars of soap and other packages are combined for promotions.

An equally important development –one that is just the opposite of multiple packaging–is "fractional packaging," which features standard put-ups divided into small inner units. Products packaged in this way include crackers, wafers, cereals, cheese, pretzels, marshmallows, drugs and toiletries. Wraps are effectively employed in forming many of these individual protected units. Fractional packaging is popular because the units are protected up to the point of actual use, so that the shopper can stock large quantities, keep them fresh longer and eliminate extra store trips.

Because of the huge volume of packaging in wraps, there is continual progress in equipment and processes.

High-speed machines for speeding up the wrapping of frozen foods and larger-sized bakery products have recently been developed and are important because they affect whole segments of a large industry. Trays of the self-lock type and machines to set them up automatically are increasing in popularity and this in turn has influenced the use of wrapping materials and equipment. Industrial packaging is receiving strong emphasis and this should open up new opportunities for wraps. For example, a number of ball-bearing manufacturers are using a new polyethylene-lined glassine to meet the exacting protection requirements of ball bearings and other pre-

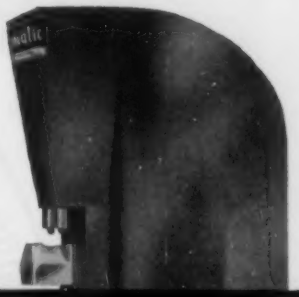


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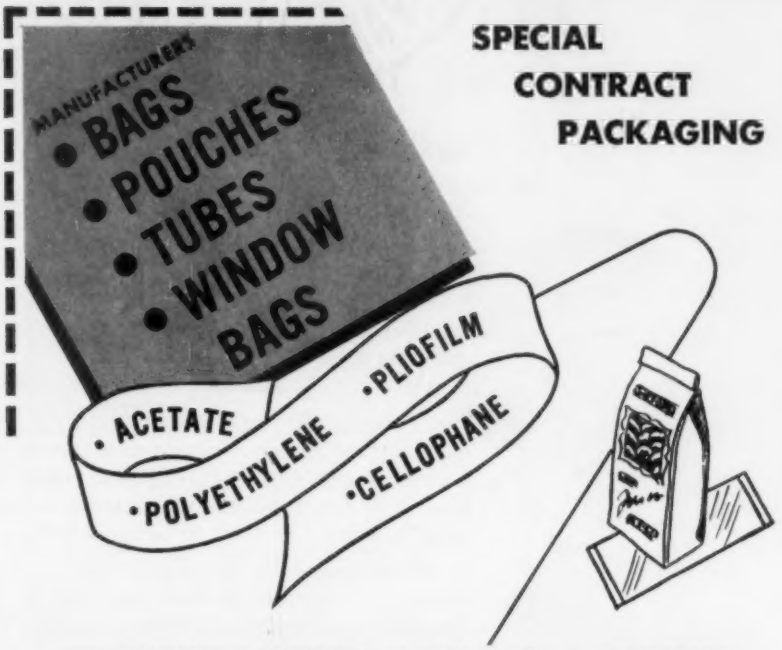
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PHOTO COURTESY MATHESON MFG. CO.



Cellophane overwrap protects frozen meats yet allows the housewife her irrevocable right to scrutinize cuts.

cision parts. Advantages of the material include excellent machinability on automatic wrapping equipment, semitransparency, economy and efficient protective properties.

Bundling

The wrapping of packages in quarter, half and dozen lots for the wholesaler is also showing progress because of the economies afforded, including savings in labor.

Since bundling employs low-cost materials such as kraft paper in roll form, large savings can be effected over expensive set-up display cartons or folding boxes. Printed paper labels are generally used and, sealed to the sides of the bundles, serve a dual purpose—they reinforce the folds of the wrap and identify the contents. Machines are now available with "printers" that will print the wrapping material as it unwinds from the roll. Automatic accumulators mounted on the intake end of the assembly eliminate hand labor heretofore needed for packing boxes or stacking.

A trend to bundling in transparent film has developed among packagers shipping unit-cartoned consumer products for the bundling of shelf quantities of 4, 6, 12 or 24 packages. Film has the advantage that no imprint is required, as the unit packages speak for themselves. The sales appeal of the packages show through when the bundles are stacked on dealers shelves; handling, inventory and keeping stock clean are all made easier. Some bundling has been in polyethylene and other films, but cellophane has come to be the most widely used because of its lower cost and trouble-free, high-speed performance on wrapping and heat-sealing machinery.[1]

[1] See "Bundlers Turn to Film," MODERN PACKAGING, July, 1955, p. 75.

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Capsules—types and uses

The capsule is a miniature package form popularly used for unit dosages of ethical drugs and vitamins and for other small-unit products which need an inexpensive but sanitary container.

In addition to many medical and veterinary medical applications, capsules have been used to package food-coloring and flavoring extracts, one-use quantities of concentrated toilet preparations like scented bath and shampoo oils, mosquito repellents, dyes, lubricating oils, adhesives and cold-weather engine-starting fluid.

Capsules are made of gelatin, which is edible and readily soluble in water. There are two principal forms: (1) the soft-gelatin type and (2) the hard, two-piece shape, often preferred for powders, which consists of two cylinders, each having a rounded end and an open end.

Hard-shell two-piece capsules are manufactured in stock sizes and may be made as small as 1.5 gr. or up to 1 oz. in capacity. They are always the same shape regardless of size, with graduated lengths and diameters allowing for different quantities of the dosage. They do not require a complete fill to make an efficient package and lend themselves to hand filling, so that they are in widespread use by the corner druggist.

The soft capsules may be made in almost any shape—oval, round, elongated or tapered at one end—and come in sizes from 1½ minims, packaging not much over a drop of liquid, up to 1 oz. Labeling for brand identity, contents or instructions is practical in the larger sizes, usually performed by decalcomania, printing or embossing.

Gelatin suffers practically no reaction with most chemicals. Nevertheless, it is important for the capsule manufacturer (who, incidentally, is also the filler) to know the compatibility of the active ingredients in the product with the gelatin, so that the capsulated dosage will remain stable throughout the period between packaging and use.

Color is often added to the gelatin before fabrication, in a wide variety of shades. Certified dyes are used for this purpose in conformity with regulations of the Federal Food, Drug and Cosmetic Act. Color has value for both industrial and medical applications, since it provides immediate identification and needed eye appeal. Some formulations screen out light rays which would affect certain product ingredients.

Equal care has been expended on the capsule container to extract the utmost in eye appeal from the finished package. Emphasis has been placed on display beauty and dispenser convenience. Made of die-cut paperboard or drawn acetate, the package acts as a presentation box with each capsule in its own recess. Dispensers include snap-up lids, sliding panels and one-at-a-time feeds.

Two-piece capsules may be filled by hand or on machines, some of which can produce as many as 400,000 finished capsules a day. About 90% of the soft, elastic containers used for medical and vitamin products are made by the rotary-die process developed in the early thirties.

The rotary-die process is credited with transforming this old pharmaceutical dosage form, of limited usefulness, into one of the most precise and useful dosage-unit packages on the market. As typical of the precision with which filling now is done, one manufacturer reports a sample run of 268 units having an over-all variation of ± 0.437% from the desired 250 milligrams. The mean was almost exactly half way between 250 and 251 milligrams, with the largest 252 and the smallest at 248 milligrams and just one of each in the total run.

Many pharmaceutical houses contract some of their capsulated preparations to the capsule manufacturer, who has on hand or available all the ingredients that will go into the particular brand. On his own premises the capsule maker compounds the formula exactly as specified, forms and fills the capsules, sometimes delivering them in their final package to the warehouse of the drug firm.

"ACCOGEL" FILLER, LEDERLE LABORATORIES



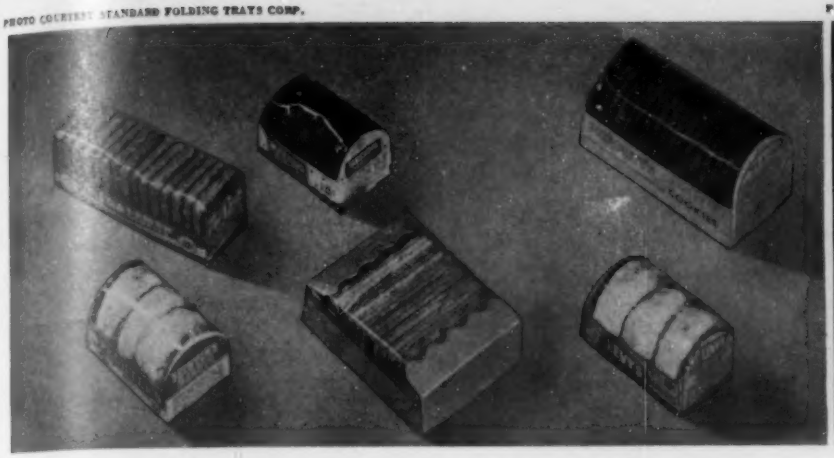
Encapsulator fills liquids, pastes into soft one-piece capsules; reportedly is only unit that handles powders.

PHOTO COURTESY R. P. SCHERER CORP.



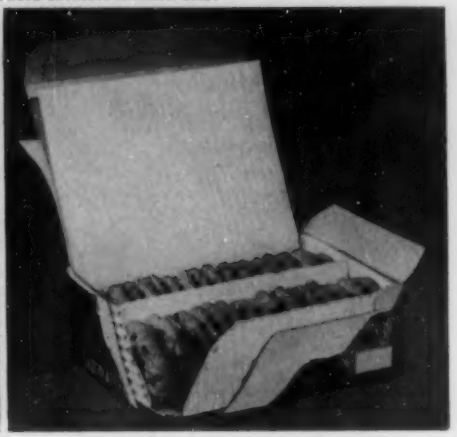
Soft, one-piece gelatin capsules for drugs and cosmetics are produced at high speeds on this rotary-die machine.

PHOTO COURTESY STANDARD FOLDING TRAYS CORP.



Economy, adaptability to manual or automatic set-up, product protection, visibility have popularized self-locking trays with packagers and consumers.

PHOTO COURTESY KLIKLOK CORP.



Self-locking cartons now have grease-proof liners inserted automatically.

Self-locking trays and cartons

A promising trend in packaging has been the development of self-locking trays and cartons which lend themselves to efficient manual and automatic set-up. Several styles of trays and cartons are available, each featuring its own type of self-locking construction—at the side or end and outside or inside the container.

Self-locking trays*

The variety of package sizes, shapes and designs that can be produced by this high-speed method has combined with the high protection and visibility offered the product in display to warrant its adoption by a rapidly increasing number of manufacturers in several fields, particularly fresh fruits and vegetables, delicatessen and many quick-frozen foods, bakery products, candies, soft goods and others.

For efficient high-speed wrapping, self-locking trays should (1) have firm side walls which do not bulge, so that they will clear the elevator shaft of the wrapping machine at top speed without jamming, (2) have rigid ends so that they will be able to pass through the heat- or solvent-sealing channels without buckling (this eliminates loose overwraps and costly re-wrapping of defective packages), (3) have a tray bottom with sufficient strength to prevent sagging, a common cause of tipping and resultant smash-up of filled packages.

As trays are always delivered from the supplier flat and folded, it is essential that they be set up at wrapping-machine speeds for maximum operational efficiency. This is done either automatically or by hand. One operator should be able to set up trays at wrapping-machine speeds in the slower ranges. Set-up speeds to 60 per minute can be achieved manually. Machines wrapping up to 90 packages per minute, however, can only be serviced efficiently using automatic carton-erecting machines, which operate at variable speeds ranging from 40 to 95 trays per minute. The best self-locking tray is often the one which can be set up either manually or automatically.

The better-quality trays that add so much to packaging and production efficiency also add sales values to the final package. Where trays are to be printed, brighter and more lasting reproduction is achieved on good stock, and the construction which holds its shape throughout the high-speed wrapping cycle has a look of quality about it that appeals to the discriminating buyer.

Self-locking cartons†

One of the most interesting developments in machine packaging is the use of hinged-cover boxes on completely automatic packaging lines. The new self-locking cartons are used in conjunction with equipment that automatically forms, loads and closes them, thus providing packagers with the means with which to mechanize completely this type of packaging operation.

The box is of the glueless or self-locking type, which when folded from a blank into its box form makes a strong, squared-up carton. There are almost no limitations to the grade and caliper of the paperboard out of which they can be made. Corrugated boxboard is also effectively used in some applications.

The patented blanks are printed and die cut at the plant of the box-maker before shipping to the user in the flat, packed in corrugated shippers or stacked on pallets. In the user's plant, machines automatically form the cartons and convey them to the loading station, where they may be loaded automatically, coded and imprinted where desired before automatic closure of the hinged lids is accomplished.

Self-locking cartons offer several built-in advantages to the packager. They take little storage space, they present no glue problems, they permit greater and more efficient hourly production and they provide a better appearance in the finished carton—at important savings in labor costs. Among the many products currently being packaged in this form are hardware and automotive parts, drugs, bakery items, candies and frozen foods particularly meats, fish and vegetables.

* This information was supplied by Henry S. Levkoff, Director of Sales, Standard Folding Trays Corp., Brooklyn.

† This information was supplied by Marshall M. Austin, Kliklok Corp., New York.

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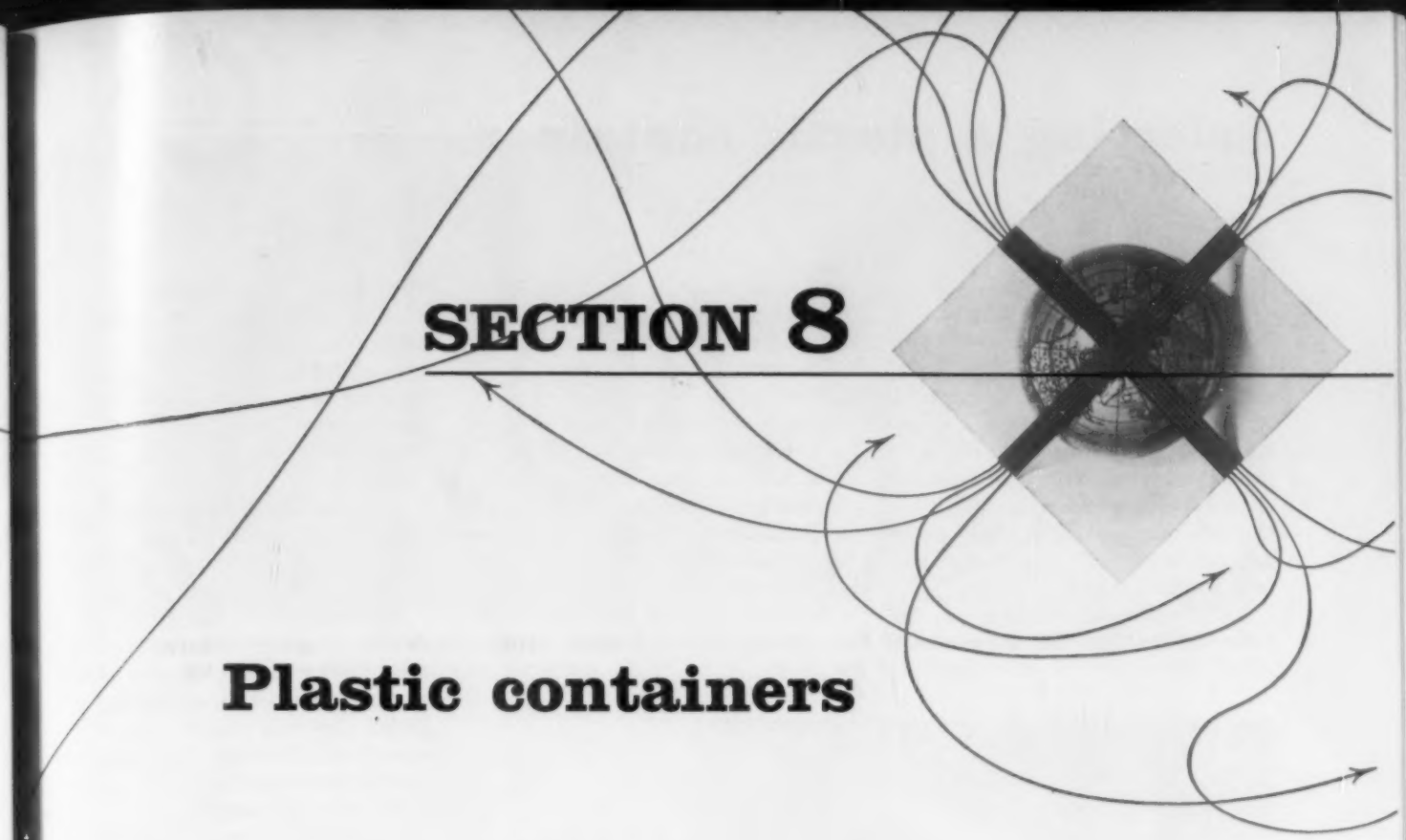
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SECTION 8

Plastic containers

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Selecting a plastic container

The decision to package in a plastic container is, of course, determined by whether or not the competitive position of your product is improved; and if it is, is it improved sufficiently to offset what may be higher packaging costs? That the decision has been moving in favor of plastics is evidenced by the ever-increasing number of products appearing in plastic packages—especially in non-luxury and food lines.

As a packaging material, plastics have much to offer. They are available in a wide range of colors and transparencies—from water clear to opaque marbled effects. In molded form, they offer virtually unlimited design possibilities. In sheet form, they offer optimum clarity and display of products at a minimal cost.

In addition, impulse value, quality impression, distinctiveness of design or permanent, protective qualities of plastic containers provide products with an additional sales advantage.

Molded packages lend themselves to dispensing features which facilitate the use of hard-to-handle products such as razor blades, pills and lighter flints. They are resistant to breakage and shattering, therefore convenient for long re-use in the home. Integral compartments tailored to small parts eliminate the need for supplementary inserts.

In considering plastics for your product, the inherent properties of the material must be viewed with respect to these "plus features."

For example, a transparent polystyrene ice-cream container increased sales 250%. Though the cost of the plastic container was higher, the added cost was readily accepted by consumers, because the packaged product was more inviting and easier to identify and purchase. In the case of a plastic container for adhesive tape, the added attraction of a dispensing-type container helped sales.

In line with the purely functional package, new vacuum-formed sheet plastics have done an outstanding job in packaging hardware fitments such as hinges and drawer handles—both complete with the screws necessary for installation. These and many similar items are now carded.

Answers to some of the problems involved in a decision to package in plastic containers will be found in the material that follows. Included are the articles "Molded Plastic Containers," p. 265; "New Challenges for Sheet Plastics," (including vacuum and pressure forming), p. 276; "Plastic Bottles, Jars and Tubes," p. 286; "Marking Plastic Containers," p. 296; and the charts on characteristics of molded and sheet plastics, p. 266 and p. 278.

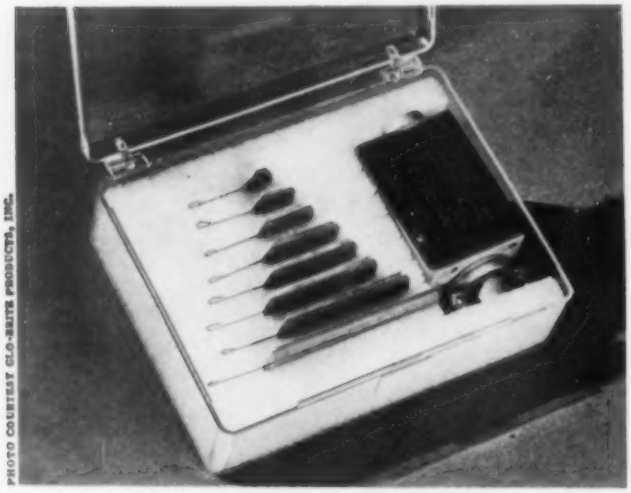


PHOTO COURTESY CLO-ERTH PRODUCTS, INC.

Prefabricated polystyrene foam platform provides functional as well as attractive display advantages for instruments.



Plastics offer packagers a wide choice of container types—bottles, jars, tubes, boxes nebulizers, globes, contoured packages and closures in a wide range of materials.



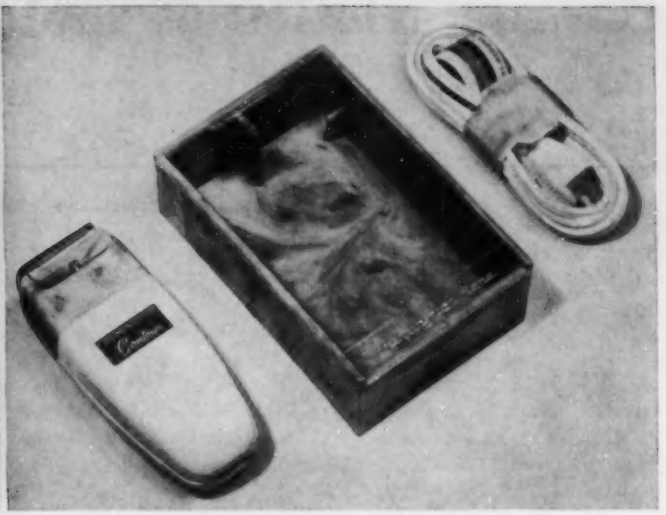
New packaging idea is vacuum-formed polyethylene container for cheese.

PHOTO COURTESY MONSANTO CHEMICAL CO.



Fitted case of styrene is not only efficient and compact for tools but wins valuable display space for them.

PHOTO COURTESY CELANESE CORP. OF AMERICA



Rigid plastics like this beautiful and useful acetate box are a logical consideration for personal or gift items.

Molded plastic containers

by ROBERT D. SACKETT*

The major types of plastics used for molded plastic containers are polystyrene, polyethylene, cellulosics, phenolics, melamine, urea and acrylics. The selection of any of these materials will normally depend on the following factors:

1. Cost per pound, units per dollar
2. Chemical resistance properties
3. Transparency or color
4. Strength
5. Methods and ease of fabrication.

The accompanying table lists the various plastics used for molded containers, giving the base price per pound and the cost per cubic inch. The chart, "Characteristics of Molded Plastics," p. 266, provides a general discussion of color range, chemical resistance, impact strength and typical uses for each of the plastic materials.

Polystyrene. Styrene plastics are used quite extensively in molded packages and probably account for major plastic poundage used in molded plastic package production. Styrene is available in an unlimited color range, including water clear. It is low in cost, has low specific gravity and excellent dimensional stability and is relatively simple to injection mold. It is resistant to most foodstuffs, but tests for resistance to possible chemical attack are recommended. Special grades are available which possess improved impact properties. Other grades with special heat-resistant properties up to 234 deg. F. can be obtained, including some that can be boiled.

Recent developments in injection-molding technique and improvements in basic flow and physical properties of polystyrene have permitted the manufacture of styrene containers in wall sections under 0.020 in. These can now compete costwise with disposable treated paper containers.

Polyethylene, widely used in the form of films and coatings, is also important in the semirigid container field, especially for bottles. (See

COST TABLE—PLASTICS FOR MOLDED CONTAINERS

Type of material		*Base price per lb., $*[1]	*Specific gravity, molded*	*Cost per cu. in., cents*	*Color range*	*Molding method*[4]
Acrylics	Clear	0.70	1.18	2.98		I
	Colors	0.75	1.18	3.20	Good	
Cellulose acetate	Clear	0.50	1.3	2.35		I
	Colors	0.46	1.3	2.16	Good	
Butyrate	Clear	0.62	1.28	2.87		I
	Colors	0.62	1.28	2.87	Good	
Ethyl cellulose	Colors	0.72	1.15	2.99	Good[3]	I
Melamine[2]	Colors	0.42	1.42	2.15	Good[3]	C
Phenolics[2]	Brn. or blk.	0.19	1.36	0.93	Limited	C
Polyethylene	Natural	0.41	0.92	1.38		I
	Colors	0.515		1.71	Limited	
Polystyrene[2]	Clear	0.295	1.05	1.07		I
	Colors	0.335	1.06	1.28	Unlimited	
Modified styrene	Colors	0.36	1.07	1.39	Good[3]	I
Ureas	Colors	0.33	1.50	1.79	Good[3]	C

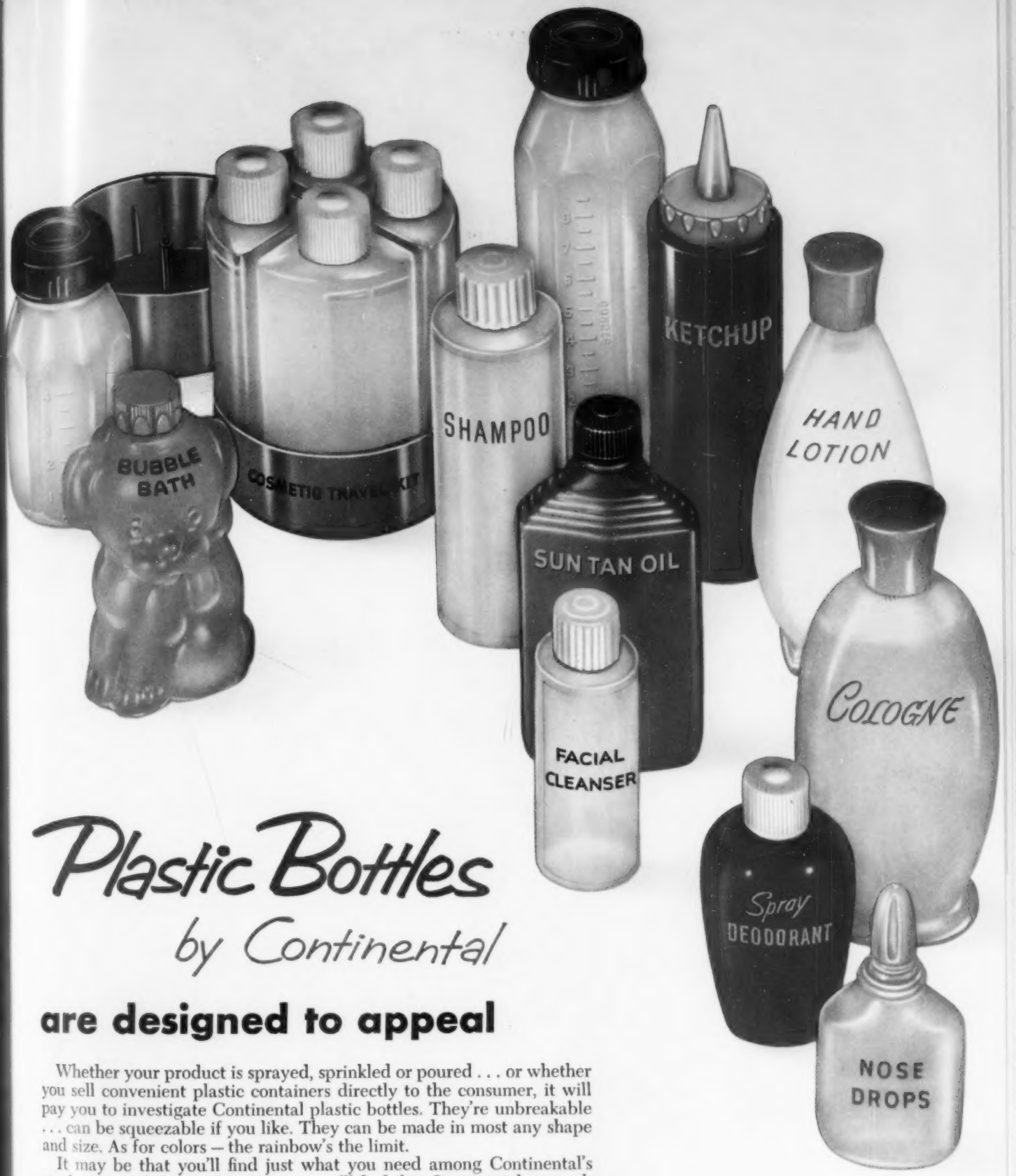
[1] The prices given here are those prevailing at the time this table was prepared. Current prices should be obtained for purposes of actual comparison.
[2] General purpose grade. [3] In solid colors. [4] I = Injection-molded. C = Compression-molded.

* Technical Service Associate, Plastics Div., Monsanto Chemical Co., Springfield, Mass.

Characteristics of molded plastics

*Type of material and general characteristics**	*Typical packaging uses*
ACRYLIC (methyl methacrylate). All colors, most commonly in colorless transparent, with unsurpassed brilliance and clarity. More durable luster than styrene. Excellent dimensional stability. Water absorption higher than styrene, lower than acetate. Excellent outdoor exposure stability. More flexible and less brittle than styrene, although not as tough as cellulose materials. Adequate heat resistance (160-180 deg. F.). Excellent odor and taste characteristics. Excellent resistance to dilute acids, alkalies and alcohols. Affected by lower ketones, esters, aromatic hydrocarbons, strong acids and alkalies.	Transparent molded boxes for cosmetics, jewelry and small products. Displays.
CELLULOSICS (cellulose acetate, cellulose acetate butyrate). Complete range of fast colors and clear transparent. High surface luster. Moderate resistance to scratching. Fair to good dimensional stability. Very tough and shock resistant. Gives considerably under stress before breakage. Adequate heat resistance for most packaging uses. Highest service temperature about 200 deg. F. Very good machinability. Cements easily and can be lacquered. Resistance to most oils, greases, weak acids and alkalies. Poor resistance to organic solvents. Good resistance to hydrocarbons, poor to lower alcohols, ketones and esters.	Jewel boxes, containers for dry products and hardware; closures and display components. Tubes and vials. Caps for aerosols.
MELAMINE (cellulose filled). Color range (same as urea) includes all whites and pastels (lightfast) in opaque and translucent. No crystal. Excellent luster. Good dimensional stability. Low water absorption. Strength properties comparable to phenolics. High torque and good shock strength. Heat resistance (210 deg. F.) better than urea plastics. Excellent taste and odor characteristics. Excellent resistance to alkalies (much better than other compression materials), very good resistance to oils, greases and organic solvents. Good resistance to weak acids.	Closures, jewelry boxes, cosmetic containers, displays – where requirements are more stringent than those met by urea. Aerosol containers.
PHENOLIC (Woodflour filled). Dark opaque colors; lighter colors tend to discolor. Luster good but not so high as thermoplastics; fair to good resistance to scratching. Excellent dimensional stability and low shrinkage. Lower water absorption than thermoplastics except styrene. Excellent mechanical properties, high rigidity, high torque strength. Heat resistance better than any other packaging plastic. Formulations available with minimum taste and odor. Excellent resistance to alcohols, petroleum, weak acids; poor resistance to alkalies.	Closures for bottles, jars and collapsible tubes. Re-use boxes. Displays for small items.
POLYETHYLENE. Inherently flexible material without plasticizers or softening agents. Excellent dimensional stability and chemical resistance. Very low water absorption and no attack by alkalies, most acids and most common chemicals below 140 deg. F. Natural resin is odorless, tasteless and extremely tough, with brittle temperature below –70 deg. C., and remaining inherently flexible over wide temperature range. Service temperatures of 185 to 200 deg. F. without warpage or distortion.	Bottles, jars, tubes, carboys, box- and contour-shaped containers. Closures, dip tubes, dispensing devices.
POLYSTYRENE. Complete range of fast colors, including transparent. Clarity superior to other plastics except acrylic. High-luster surface, easily scratched. Usually considered somewhat brittle. High dimensional stability, negligible water absorption. Tensile strength is high but has little "give" when stressed or shocked. Adequate heat resistance (about 170 deg. F.) for most packaging uses. Virtually complete freedom from taste and odor. Unaffected by common acids, alkalies and alcohols. Poor resistance to petroleum derivatives and certain essential oils. Three types. See ASTM specification D-703-49T.	Cosmetic containers, acid bottle closures, crystal boxes for small parts, general-purpose injection applications. Compartmented boxes, hinged boxes.
UREA (cellulose-filled) Colors include all whites and all shades (lightfast) in opaque and translucent. No crystal. Excellent luster, comparable to thermoplastics. Good dimensional stability. Will not soften on exposure to heat. Strength properties good. High rigidity. Heat resistance (170 deg. F.) better than thermoplastics but inferior to phenolic. Excellent taste and odor characteristics. Good resistance to alcohols, oils, greases and weak acids. Poor to fair resistance to alkalies.	Closures, especially for cosmetic and personal product containers, where attractive appearance is important. Jewelry boxes, cosmetic containers, displays.

* Manufacturers of these materials are listed in the Buyers' Directory, p. 679, under "Plastic Molding Materials," also consult Section 8 advertising for additional information.



Plastic Bottles *by Continental*

are designed to appeal

Whether your product is sprayed, sprinkled or poured . . . or whether you sell convenient plastic containers directly to the consumer, it will pay you to investigate Continental plastic bottles. They're unbreakable . . . can be squeezable if you like. They can be made in most any shape and size. As for colors — the rainbow's the limit.

It may be that you'll find just what you need among Continental's stock sizes and shapes. In any case, you'll find that Continental research and engineering people, and designers, too, have a lot of new ideas for increasing appeal with plastic bottles. Why not let them help you?

CONTINENTAL CAN COMPANY

Our Fiftieth Year of Tailor-Made Packaging

MILLSPLASTIC DIVISION

135 SOUTH LA SALLE STREET • CHICAGO 3, ILLINOIS

"Plastic Bottles, Tubes, Jars," p. 286.) It is a semi-flexible, highly durable material; has low water-vapor transmission rates and possesses excellent chemical resistance and strength properties for (1) dispenser-type packages like blow-molded "squeeze bottles," (2) injection-molded, re-use, nonbreakable containers and (3) for certain applications in industrial packaging. Polyethylene's color range is somewhat limited. Expanded production and a downward price trend indicate increasing usage is ahead.

Because polyethylene has excellent flexibility and can be molded with ease, it has been possible to mold hinges as an integral part of a container. This results in a rugged package and eliminates costly mold design and post-molding problems.

Now on the way is high-molecular-weight polyethylene, made by a new low-pressure, low-temperature method. Improved properties including greater tensile strength have been demonstrated by experimental quantities of the new-type polyethylene. A maximum use temperature of 250 deg. F. indicates polyethylene containers that can be sterilized by steam will be practical. High-molecular-weight polyethylene may open up markets for thin-wall molded containers, because increased rigidity may be obtained where desired.

Cellulosics. These plastics are noted primarily for wide color range, mechanical strength and toughness. They are used mainly where impact strength is of prime importance. Butyrate or ethyl cellulose is preferred over cellulose acetate where dimensional stability is required. The latter has excellent low-temperature properties.

Phenolics are also compression-molding materials and it should be noted (see Table) that they possess the lowest cost per cubic inch. Their color range is limited to dark colors, primarily black, brown and red. They are available in varying impact grades. Phenolic is not widely used in the manufacture of packaging containers because of its dark color and high specific gravity. It is, however, used widely to manufacture closures.

Melamines normally are restricted to closure applications because of their higher cost. They do possess excellent flexural strength and shock resistance and lack odor and taste. They are compression-molding materials and are available in limited, opaque colors.

Urea is a compression-molding, chemical-resistant material available in a wide range of colors. It has excellent resistance to common solvents, alcohols and essential oils. It is non-electrostatic and does not attract dust. This material has excellent surface hardness and abrasion resistance and is used primarily in higher-priced packaging when luxury appeal or chemical resistance is important.

PHOTO COURTESY HAKE PLASTIC BOX CORP.



Wide variety of shapes and sizes of stock-molded hinged boxes is available for products such as jewelry, cosmetics, novelties, etc.

Acrylics. In general, acrylic resins are characterized by excellent appearance qualities, dimensional stability, resistance to outdoor weathering and chemical resistance. Improved heat-resistant formulations are available which tolerate brief immersion in boiling water and are resistant to temperatures up to 195 deg. F. Because of its high cost, this material is best used in packaging luxury items.

Cost considerations

The cost of a molded plastic package depends on the following factors:

Custom or stock design. Strictly

PHOTO COURTESY IRA HARMON CO., INC.



Custom-molded containers can meet specific requirements of manufacturer. These clear boxes make the most of product's eye appeal at retail level.



SPEEDS HOUSEHOLD CHORES

EXCELLENT FOR FOOD PRODUCTS

FLEXIBLE PLASTIC TUBES

Bracon®

SQUEEZE-TO-USE BOTTLES



CONVENIENT FOR MESSY TASKS

CLEAN AND EASY TO USE



MANY MEDICINAL APPLICATIONS

SAFE IN BATHROOM

PRACTICAL PLASTIC PACKAGES low in cost . . . tops in merchandising appeal!

There are countless reasons for BRACON tubes' and bottles' immediate success. Priced right for mass marketing. Superb printing and color for eye-appeal. Lightweight. Non-breakable. Non-toxic. Chemically inert. Completely functional because they release their contents conveniently — just by a gentle squeeze.

When you choose a BRACON tube or a BRACON bottle — your product goes to market with lower shipping costs, less spoilage and a better chance for retail attraction. You have a choice, too, because BRACON tubes and bottles range in capacity from a few cc's to 32 ounces, with many stock spray nozzles and dispensing devices available.

BRACON polyethylene tubes and squeeze-to-use bottles are America's newest and fastest growing packaging development. For further information please write, stating product to be packaged and capacity desired.

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another phase of Auburn's
one-stop plastic molding service...

PLASTIC PACKAGING



In addition to molding plastic parts in volume for modern industry, Auburn also supplies plastic containers for a variety of packaged items. Many successful applications (like those above) have brought better packaging at greatly reduced costs to our sales minded customers. To this day, Auburn is the leading designer and manufacturer of polyethylene self-hinged containers.
Constant research and 79 years' experience have made Auburn the leading molder of plastic parts in America. Our engineering and design services are available to our customers without charge and usually result in cost savings for you in both mold and plastic part.

AUBURN OFFERS ONE-STOP PLASTIC MOLDING SERVICE . . . we develop, recommend and can make finished products from any plastic compound, using the best one to fit your individual needs. Complete facilities now include:

- **Injection molding machines up to 22 oz. capacity**
- **Compression, transfer and high speed plunger presses up to 600 ton capacity—plus**
- **Automatic rotary presses for parts up to 4 sq. in.—plus**
- **Stokes automatic presses**
- **Extrusion machines up to 4½" screw size**
- **Made-to-order vinyl plastisols and dry blends**
- **Precision tool and die shop**
- **Design, engineering and laboratory services**

Write today for a complete Auburn catalog to:

Auburn Button Works, Inc.
AUBURN, NEW YORK

PHOTO COURTESY EASTMAN CHEMICAL PRODUCTS, CO.



Extrusion-molded butyrate makes transparent container for small hardware. Plastic surface is resilient; keeps out rust and dirt.

speaking, perhaps, there is no substitute for a package that is custom designed for a product. Nevertheless, there are situations where promotional timing or marketing-budget limitations will not permit adoption of an exclusive package. In these instances, the most practical approach is to choose one of the many stock-molded packages available and to use one or more post-molding treatment.

Mold cost. Plastic molds are precision tools requiring the best of materials in order to maintain exact dimensions and to resist pressures between 10,000 and 20,000 psi. As such, these tools are expensive, with $10,000 to $15,000 not uncommon for packaging molds. Mold cost, therefore, usually must be written off over a relatively long run.

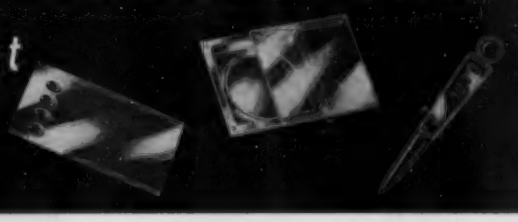
In general, injection molds are more expensive than compression molds and lend themselves to considerably more detail. The manufacturing cost of an injection-molded item is generally lower and tends to offset higher mold cost on longer runs. The factor determining whether injection molding or compression molding is done generally is the material selected.

Mold cost, of course, increases with complexity of design. However, where sufficiently long runs are involved rather detailed designs may be had at a very slight or negligible increase in unit cost, providing good design procedure is followed throughout.

Considerable interest is being shown at present in the use of smaller auto-

SALES-VIEW PACKAGING

Designed To Fit Your Product
By PLASTIC ARTISANS, INC.



CONTOURED DOME PACKAGING



One of several items in the La Cross manicure line using DOMEPAK.

1 Plastic Artisans DOMEPAK

New, Low-Cost Show-Packaging Technique

Clear plastic dome containing the product projects through die-cut card and is locked by a label to the card back only. The label is applied automatically by a labeling machine, minimizing assembly costs.



2 Slide-On Domes

Track-edged, clear plastic sheet formed with single or multiple domes is slipped over a printed card or blotter which holds product in place.

Sampler for Chas. Pfizer & Co. Inc.



Flash Card for Ayerst Laboratories, Inc., has tablet-shaped domes sealed in two-ply card.

3 Domes Sealed In Double Ply Cards

Dome projects through die-cut opening on front of adhesive-backed card. Card folded over and sealed to itself traps dome flanges firmly in position. Back sheet may be blotter to offer utility.



4 Domes Stapled Or Sealed To Single Ply Cards

Dome flanges are fastened directly to card by staples or by sealing to a prepared surface on card.

Stapled, contoured dome holds Risdon Snap Fixers to card.

CONTOURED SLIDE COVER BOXES

For Visible Sales Appeal Plus Re-Use Value



1 As Complete Packages

Slide cover can be rotogravure printed or printed sheet can be slipped beneath it for product identification.

Printed Slide Cover Box Package For Ednalite Optical Co.



Traum Tailer Tacker uses multi-contoured Slide Cover Box stapled to card.

2 Assembled To Cards

Slide Cover Boxes can be stapled to cards or slipped onto tabs attached to cards or folders. There are several variations of this method, using die-cut cards, perforated or scored tabs facilitating detachment, etc.

PA-107

Plastic Artisans has the experience, design ability and specially-designed, automatic, mass-production equipment to give products new, visible sales-appeal. For further information on show-packaging your product contact Plastic Artisans, today.

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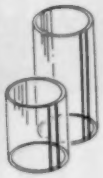
Custom Design & Mass Production of Quality Packages & Promotional Novelties in Clear, Opaque & Colored Plastics





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Completely re-engineered for greater speed. Beads 500-900 cylinders per hr. Fully automatic! Operator places the cylinders in chute and the beaded cylinders are automatically ejected.





• **NEW TABER CYLINDER MAKER**
New, improved model assures greater speed and fewer rejects. Automatic sizing eliminates crooked seams, misfitting bodies, etc. Expanding mandrel (1½" to 8½" diam.) and sealing bar are foot operated.

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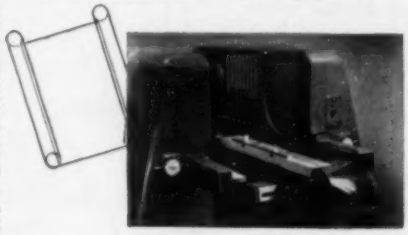
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SHEET PLASTIC FABRICATING EQUIPMENT



• **180° PLASTIC FOLDER**
Forms the desired fold under heat and pressure resulting in a permanent shape eliminating tearing and cracking. Folds cellulose acetate sheet .005" to .020" thickness in "U" type 180° fold with "snap." Does 700 single folds per hour or MORE with multiple folding. Front gauging tables now standard equipment.

• **STRAIGHT EDGE BEADER**
Beads two edges at once at HIGH speed of transparent acetate rolls, strips or blanks 2" to 20" wide. Cuts costs drastically. Heads can each be used as single edge beaders. Pyrometer temperature control included as standard equipment.

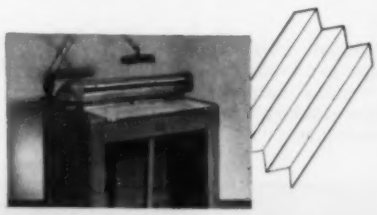






• **TABER CREASER**
"Instant-Crease" feature gives MORE right-angle creases in LESS time and fewer rejects. Handles .005" to .020" thickness cellulose acetate up to 30" wide. Designed to handle 2 blades if desired.

• **PNEUMATIC DRAW PRESS**
For drawing and forming cast or extruded plastic sheet into round, oval or special shape closures. Takes interchangeable dies from 2" to 8½" diam. and ⅛" to 1" in height. Adjustable from 5 P.S.I. to full line pressure.



Write to Section 20 for illustrated literature

Taber

TABER INSTRUMENT CORP.

111 Goundry Street N. Tonawanda, N. Y.

PHOTO COURTESY BAKELITE CO.



This handy polyethylene vial for drugs has a flip-up non-losable cap.

matic machines running relatively inexpensive dies. A number of small automatic machines are currently on the market and, as these are improved, it is inevitable that their use in packaging will become a major factor in expanded use of molded containers.

Material requirements. Material selections will be based primarily on physical and chemical-resistance requirements of the application. As indicated above, the material selected will determine the method of manufacture and consequently affect cost.

Cost of the molding material as a percentage of finished package cost will vary with the number of post-molding operations. In all cases material cost is an appreciable factor and can be roughly figured at 50% of total cost.

Design principles

When custom-made containers are desired the importance of working with competent mold makers, molders and material suppliers during the design stage cannot be overemphasized.

Injection molding. This process consists of forcing a heated, viscous thermoplastic material into a closed die under relatively high pressure. Scrap and rejects may be remolded.

1. Undercuts must be avoided (unless special cam or air-operated devices are provided for the mold).
2. Draft or taper should be a minimum of about 1 to 2 deg. per side
3. Maintain uniform wall sections

DISPENSER, STERLING MOLDERS, INC.



Handy flint dispenser is molded polystyrene case with polyethylene wheel.

throughout piece—usually in the range of 0.040 to 0.080 in. thick.

4. Normally, for maximum strength use center gating—use restricted gating where possible.

5. Avoid sharp corners by providing ample radius.

6. Where hinges are involved, molded-in type (ball and socket) will reduce cost. In flexible materials like polyethylene, cover and base can be molded as a single unit.

Compression molding. This process is used primarily for thermosetting materials such as ureas and phenolics. These materials cannot be remolded once the resins have been cured. Essentially, the process consists of heating and the simultaneous flowing and reacting of the plastic completely within the plastic mold.

1. Undercuts must be avoided (unless special cam or air-operated devices are provided).

2. Minimum draft ½ deg.—preferably 1 to 2 deg.

3. Maintain uniform wall sections throughout piece—usually in the range of 0.062 to 0.080 in. thick.

4. Avoid sharp corners.

5. Pin hinges or Rathbun-type special clip hinges normally used.



PHOTO COURTESY, EASTMAN CHEMICAL PRODUCTS, INC.

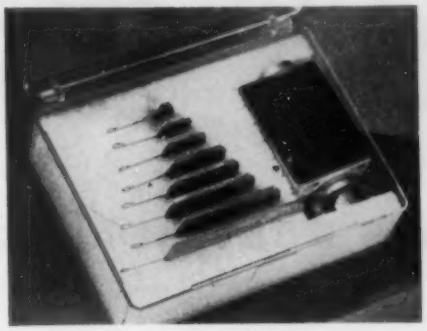
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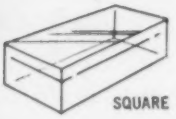
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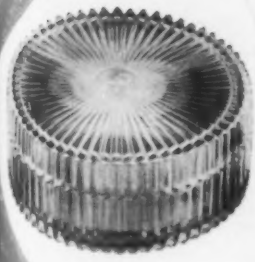
LUSTREX* styrene molding compounds Supplied in a wide range of transparent, translucent and opaque colors, and crystal. Products molded of Lustrex include jars, boxes, display units, signs, counter displays, closures. Lustrex is tough, shatter-resistant, free from taste and odor, has high dimensional stability, is resistant to water, common acids and alkalies. Modified grades available where high impact strength and high heat resistance are required. Ideal for custom packages.

VUEPAK* cellulose acetate Supplied as crystal-clear, rigid film in continuous, untrimmed and slit-to-size rolls up to 60″ wide and 2,000′ long, .005″ to .020″ thick. Also in stock size sheets. Vuepak is light in weight, tasteless, odorless and non-toxic. Can be fabricated in fast automatic machines. Vuepak combines readily with boxboard, metal and other materials. Takes printing, embossing and stamping. Perfect for "see-through" packaging of candies, housewares, wallets, jewelry and gift items.

ORIZON* polyethylene resin Supplied in pelleted form, natural or colored, for molded products, coating and film. Squeeze bottles and containers molded of Orizon are light, smooth and pliable, tough, resilient and impact-resistant. Film extruded of Orizon is ideal for produce bags and protective covers for soft goods. Orizon is also widely used as a laminated coating for paper, films, fabrics and foils.



ACKAGED IN MONSANTO PLASTICS



"Helena Rubinstein" container for cosmetics. Molded of Lustrex (styrene) by Morningstar Corp., Cambridge, Mass.



"Bon Voyage" container for Lee Hats. Fabricated of Vuepak (cellulose acetate) by J. E. Plastics Manufacturing Corp., New York, N. Y.

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*LUSTREX, VUEPAK, ORIZON: REG. U. S. PAT. OFF.

New challenges for sheet plastics

One of the most challenging new directions in packaging involves the use of containers formed or fabricated from plastic sheet. These containers—offering visibility, rigidity and low cost—are doing extremely important jobs in the growing area of self-selection packaging. And their future has only just begun.

There are three processes available in the producing of packages and package components from plastic sheet. These are (1) *vacuum forming*, (2) *pressure forming* and (3) *sheet fabrication*. Vacuum and pressure forming are quite similar in methods used and types of containers produced. In both processes the sheet is heated until it is soft and then is forced into a cavity mold or over a profile mold. Vacuum forming employs atmospheric pressure (15 lbs. per square inch) as the molding force. Pressure forming employs air pressure of approximately 75 to 80 lbs. per square inch. Fabricated sheet-plastic packages are largely similar to a set-up paper box in construction. Sheets are scored and seamed to form a box. Or the sheet may be shaped and seamed or beaded to form a cylinder.

Materials. The principal sheet plastic used in fabricating packages is cellulose acetate. However, vacuum and pressure forming have already brought butyrate, polystyrene, vinyl and polyethylene more prominently into the picture. Acrylic sheet is used for some fabricated package applications, but not on a large scale. It, too, can be vacuum formed. A description of these materials is given in the chart, "Characteristics of Sheet Plastics," appearing on page 278. For the purposes of this article, plastic 3 mils (0.003 in.) thick or thicker is classed as sheet stock. Webs less than 3 mils thick are classed as films. (See "Plastic Packaging Films," p. 102; also the chart, "Properties of Packaging Films," p. 118.)

Vacuum and pressure forming

Major interest on the part of packagers has centered around the vacuum- and pressure-forming processes. The reasons for this are not hard to find. The methods and equipment involved are relatively simple. Low-cost plaster, wood or metal molds can be used. In some instances the product itself—especially, tools, instruments, hardware and similar rigid items—can be the mold. Tooling-up time is relatively slight. Perhaps most important of all is the fact that forming is an extremely versatile method. As a result new developments have occurred at a fast rate.[1]

Formed packages are produced in a very wide variety of types, including boxes, trays, compartmented units, containers contoured to the shape of the product and containers incorporating hinged, slide-open or snap-in covers. These containers, which can be produced in so many styles, shapes and size variations, lend themselves to unit, strip and multiple packaging techniques—approaches that are proving so wonderfully effective in modern merchandising. Formed-sheet containers have been used primarily for hardware, toys, notions and similar products. However, the formed-sheet package is used with great success for food products and there can be no question but that even more extensive applications for foods will be introduced.

Packaging components, such as closures, lids, dividers, platforms and liners, are being produced by forming plastic sheet. The ease and simplicity of forming tends to offset higher materials costs. Thus plastic trays, platforms and similar accessories can, in many instances, compete with paperboard units that enjoy lower material costs but involve relatively high-cost scoring, die cutting, handling and similar fabricating steps.

Plastic sheet can be pre-printed with a distorted design prior to forming. Thus lifelike replicas can be reproduced realistically in natural colors. This has permitted formed plastics to become extremely important in the display field. The elements of color and design realism have not yet been exploited to any extent in the forming of packages, but the potential exists—and it should be very much worth exploring, especially where any thought is to be given to premium, novelty or re-use containers.

Formed sheet can be metalized or flocked and it can be embossed or debossed in the forming process to produce a challenging variety of textured surfaces. An outstanding application of vacuum forming in this connection was an acetate outer wrap used for a gift canister of whiskey. The plastic sheet was metalized and the surface was embossed in a basket-weave pattern—producing an effect both novel and luxurious.

Plastic domes or blisters

The formed bubble or blister used in conjunction with a card or folder has enjoyed rapidly increasing popularity with packagers of many different types of products. Many new techniques have been developed, particularly in the method of affixing the dome and product to the merchandising card. Among the methods now being used are the following: (1) sta-

[1] See "The Rush to Formed Plastics," MODERN PACKAGING, Mar., 1955, p. 79.

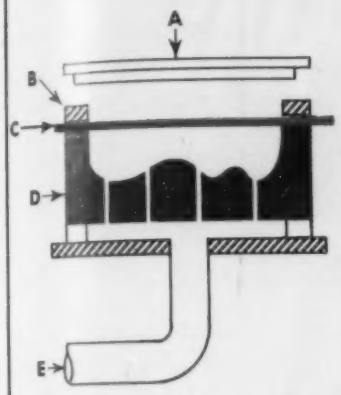


PHOTO COURTESY ALTO-VAC CO.

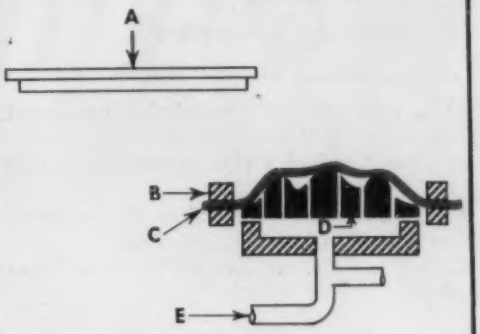
In this new method of packaging, thin sheets of plastic are vacuum formed over hardware parts and in the same operation are heat sealed to the display card. Die-cut perforations take positioning pins to hold products in place during forming operation.

Sheet Forming Techniques

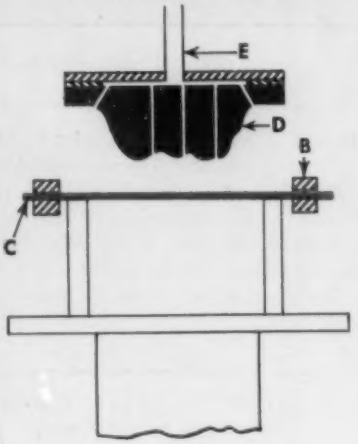
1. STRAIGHT VACUUM FORMING



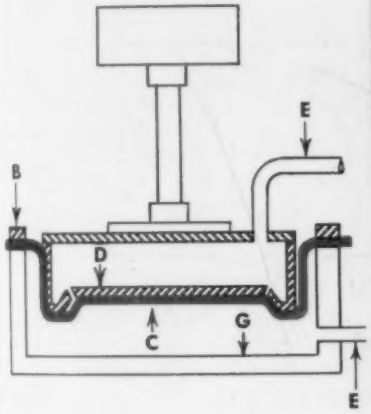
2. DRAPE VACUUM FORMING



3. FORCE ABOVE SHEET



4. VACUUM SNAP-BACK FORMING



A wide variety of sheet forming techniques are available to satisfy many different types of job requirements. Most of these are variations of the following basic methods:

1. Straight Vacuum Forming—Clamped in stationary frame, heated sheet is vacuum drawn into mold.

2. Drape Vacuum Forming—Movable frame stretches sheet over male mold before vacuum is pulled.

3. Force Above Sheet—Mold descends onto heated sheet, partially forming it; vacuum is then pulled.

4. Vacuum Snap-Back Forming—Vacuum is pulled, drawing pre-heated sheet into cavity (G). Male plug moves down until it reaches a predetermined position. Vacuum is then applied in male plug.

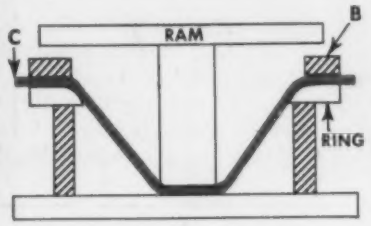
5. Plug and Ring Forming—Heated sheet is placed over a ring and clamped down. Mold mounted on ram is forced into it.

6. Forming into Female with Helper and Air Pressure—As press closes, cored plug pushes heated sheet into cavity. Air pressure is then introduced through cored plug, pushing sheet into female mold. Holes in mold let air escape.

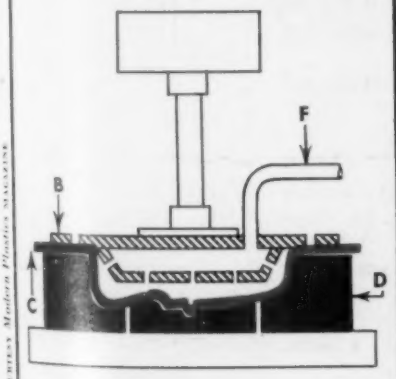
7. Pressure Forming—After heating, framed sheet is formed between matched male and female dies.

Legend: A—Heater; B—Clamp; C—Plastic Sheet; D—Mold; E—Vacuum Line; and F—Air-Pressure Line.

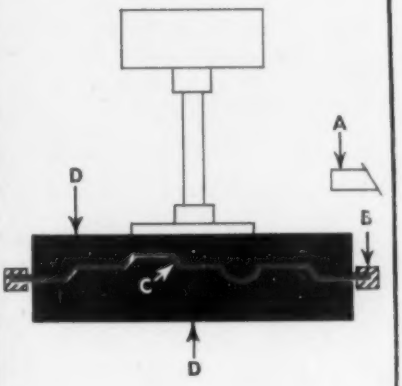
5. PLUG and RING FORMING



6. FORMING INTO FEMALE WITH HELPER AND AIR PRESSURE



7. PRESSURE FORMING



DRAWINGS COURTESY *Modern Plastics* MAGAZINE

Characteristics of sheet plastics

Types of material and general characteristics[1]	*Typical packaging uses*
ACRYLIC (methyl methacrylate). All colors, most commonly in colorless transparent, with unsurpassed brilliance and clarity. More durable luster than styrene. Excellent dimensional stability. Water absorption higher than styrene, lower than acetate. Excellent outdoor exposure stability. More flexible and less brittle than styrene, although not as tough as cellulose materials. Adequate heat resistance (160-180 deg. F.). Excellent odor and taste characteristics. Excellent resistance to dilute acids, alkalies, and alcohols. Affected by lower ketones, esters, aromatic hydrocarbons, strong acids and alkalies.	Fabricated or formed transparent containers or displays.
CELLULOSICS (cellulose acetate and cellulose butyrate, cellulose triacetate). Colorless transparent; wide color range. Excellent retention of clarity and transparency, or of color, in service. Moderate resistance to scratching. Good dimensional stability. Poor moisture barrier. Good strength properties. Heat resistance generally adequate. Excellent fabricating properties. Heating required for creasing, folding, etc., except in very soft formulations. Excellent drawing and forming characteristics. Cements easily. Takes printing, marking. Satisfactory odor and taste characteristics for most packaging applications. Resistance to most oils, greases, weak acids and alkalies. Good resistance to hydrocarbons, poor to lower alcohols, ketones and esters.	Rigid transparent and colored boxes, tubes, covers and displays. Vacuum or pressure formed containers, blisters, bubbles, "skin packs."
POLYETHYLENE. Natural color, slightly cloudy, translucent. Polished sheets exhibit better clarity. Excellent dimensional stability under humidity changes. Very flexible over a wide temperature range down to —70 deg. F. Very low moisture absorption. Odorless and tasteless. Resistance to most organic and inorganic solvents. Not resistant to hydrocarbons, oils and greases. Good resistance to acids, alkalies below 140 deg. F. Excellent electrical properties. High rate of gas permeability to oxygen, carbon dioxide, etc.	Food and drug containers. Cap liners. Drum liners Vacuum formed containers.
POLYSTYRENE. Colorless transparent and very wide color range. Surface scratches fairly easily. Satisfactory aging and sunlight properties. Very high gloss. Low specific gravity. Stiffer than acetate. Excellent dimensional stability. Low water absorption. Heat resistance excellent up to critical temperatures (165 to 195 deg. F.). Excellent low-temperature properties. Can be heat formed and drawn, using special techniques. Excellent odor and taste characteristics. Can be printed. Excellent resistance to alkalies and acids, alcohols, and greases. Poor resistance to organic solvents.	Windows and display cartons, closures, drawn boxes, envelopes, spiral-wrapped tubes.
MODIFIED POLYSTYRENE (high-impact alloyed polystyrene). Complete range of opaque and translucent colors. Surface available in mat or gloss finish. Will scratch fairly easily. Low specific gravity. Excellent dimensional stability. Very low water absorption. Adequate heat resistance (180 deg. F.) for most packaging. Becomes brittle at low temperatures. Excellent odor and taste characteristics. Can be readily vacuum or pressure formed. Can be printed. Unaffected by common acids, alkalies and alcohols. Poor resistance to petroleum derivatives and organic solvents. Approved for contact with fresh meats.	Formed rigid containers, such as boxes, shaped product trays and fresh-food baskets.
VINYL CHLORIDE AND COPOLYMER. Good retention of clarity and transparency. Surface scratches fairly easily. Low water absorption. No warpage due to water absorption. Good moisture barrier. Embrittles at very low temperatures. Good dimensional stability. Permanent bonds secured by heat and solvent sealing. Good strength properties, somewhat better than cellulose materials. Heat resistance adequate. Excellent fabricating properties. Excellent hot drawing. Takes printing, marking well. Excellent resistance to strong acids and alkalies, alcohols, oils and greases. Attacked by some organic solvents.	Rigid transparent boxes, tubes, drawn covers and display components. Vacuum formed containers and liners. Pre-printed vacuum formed displays, package replicas, emblems, etc.

[1] Manufacturers of these materials are listed in the Buyers' Directory, p. 679, under "Plastic Sheet," also consult Section 8 advertising for additional information.
[2] For materials under 0.003 in. in thickness see "Properties of Packaging Films" in Section 4.

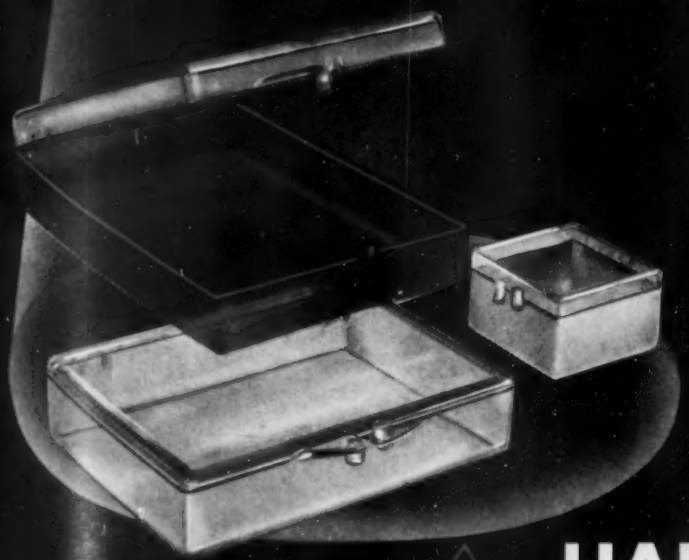
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HAKE PLASTIC BOXES OFFER YOU:

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- Added sales impact through better "showcasing", plus protection from dust and handling.
- A unique patented hinge* that enables you to package in a hinged plastic box at very low cost.
- A wide range of STOCK sizes in clear, tutone or opaque, together with quality workmanship and materials.
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THE WORLD'S LARGEST MOLDER OF SMALL PLASTIC BOXES

*The Hake hinge is fully patented in both the United States and Canada.

pling, (2) cohesive-backed folders that lock the bubble into position, (3) labels automatically applied to the back of the card to hold the dome in place and (4) thermoplastic-coated cards that permit the dome to be heat sealed to the card.

There is a newer version of the heat-sealing method called "skinpack" that has awakened much interest on the part of packagers. The thermoplastic-coated card is placed in the bed of the forming machine. The products are positioned on the card and the sheet is drape formed over the product (which becomes the actual mold) and is sealed to the card in a single operation. The cards are perforated to facilitate the drawing of the vacuum. Studs or pins can be inserted through the card to aid in the positioning of the product or component items such as screws or nuts and bolts. The pins can be arranged to form an individual dome or compartment over the component parts. After forming, the card is lifted away from the pins. Very thin gauges of sheet can be used in the "skinpack" method of forming and, since the product becomes the mold, the process is both versatile and economical. In one variation of the method, toy soldiers are strip packaged in plastic sheet. A paperboard card is not required. The plastic is vacuum formed around each toy soldier and holds it secure. This method, it would seem, should be practical for many types of small products such as marbles, metal buttons and the like.

There are a number of forthcoming developments that will bear watching in the vacuum-forming field. First, there is increasing emphasis on the part of materials producers to manufacture sheet stocks specifically recommended for vacuum forming. In addition, numerous brand-new or improved types of equipment have been introduced. It appears likely that increasing application will be made of polyethylene and modified or high-impact polystyrene. A low-cost, throwaway, vacuum-formed polyethylene container has already been developed and is being used for cottage cheese and fresh liver.

Most pressure-forming operations now involve working from roll stocks, whereas vacuum forming has involved working with sheets fed manually into the vacuum-forming machine. However, vacuum-forming machines are now available that are designed for continuous, fully automatic operation.

In several applications, all outside the field of packaging, vacuum-forming equipment has been placed in-line with extruding equipment. The plastic resin is extruded into sheet and the sheet, while still hot and soft, is conveyed through a vacuum former and then on through finishing or similar steps in fabrication. Installations of this type, it is believed, are one of the important logical steps to come in packaging.

Another forward step that is helping pace advances in vacuum forming is the adaptation and improvement of heat sealers to handle more intricate sealing jobs and to seal larger areas. Modern heat-sealing equipment and techniques make vacuum and pressure forming extremely versatile processes in packaging applications. A new package for bearings is a vacuum-formed transparent plastic sheet that is compartmented to hold individual bearings in a small quantity of oil. A plastic sheet is heat sealed over the compartmented base after the latter has been filled with bearings and small quantities of oil. The multiple-unit package is sealed in such a way that each packaged bearing may be cut off one at a time as needed. Heat sealers have also been adopted to seal an entire sheet of plastic-domed products to a thermoplastic card. The method is especially practical for multiple-unit packages, gift sets, toys, games, family-size packs, etc.

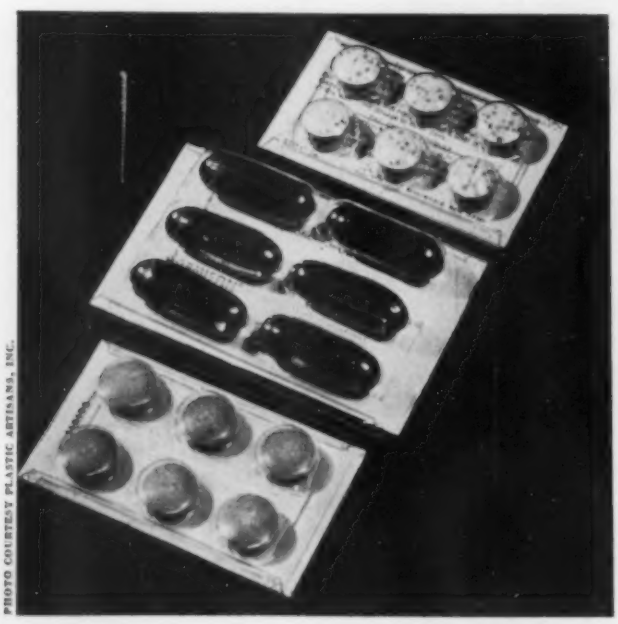


PHOTO COURTESY PLASTIC ARTISANS, INC.

These packages feature a formed, transparent, flanged plastic dome. Dome slips over base component. Variations of this package serve many products, especially pharmaceuticals.

Sheet fabricated packages

The fabricated plastic container, as previously described, is a set-up box, cylindrical structure or modification of the folding box. It is made of semi-rigid transparent plastic sheet. Generally, the sheet is transparent, although colored or opaque sheets are sometimes used.

Among the available types, cylindrical containers represent the least costly, most versatile and one of the most popular fabricated plastic packages. The cylindrical container's low cost is a reflection of production facility. Present automatic equipment laps, double beads and ejects finished packages in one continuous operation. Other equipment is available which, in addition, seals the tubes.

Fabricated rounds or ovals are produced on semi-automatic set ups, the heart of which is the drawing or stretching of conditioned sheet in a die.

Square or rectangular containers are relatively more time consuming to fabricate because of the corner flange seals required. Progress in the form of automatic electronic welding has done much to increase the speed and efficiency of the operation.

On the whole, fabricating transparent containers is a specialized skill, and the industry is made up to a large degree of these specialists. However, most conventional set-up-box manufacturers maintain plastic package departments as a supplementary service to their customers. (See "The Set-Up Box," p. 206.) In addition to this, some manufacturers have found it economical to purchase the simpler equipment and produce basic cylinders or drawn containers in-plant.





WHY LEADING PACKAGERS COME TO PRESCOTT, ARIZONA









With apologies to Emerson... "the world will beat a path to the plant that produces better plastic containers." And here are five all-important reasons why more and more leading manufacturers are beating a path to Prescott for packaging:

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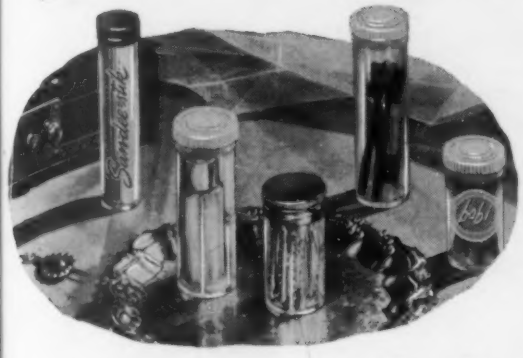
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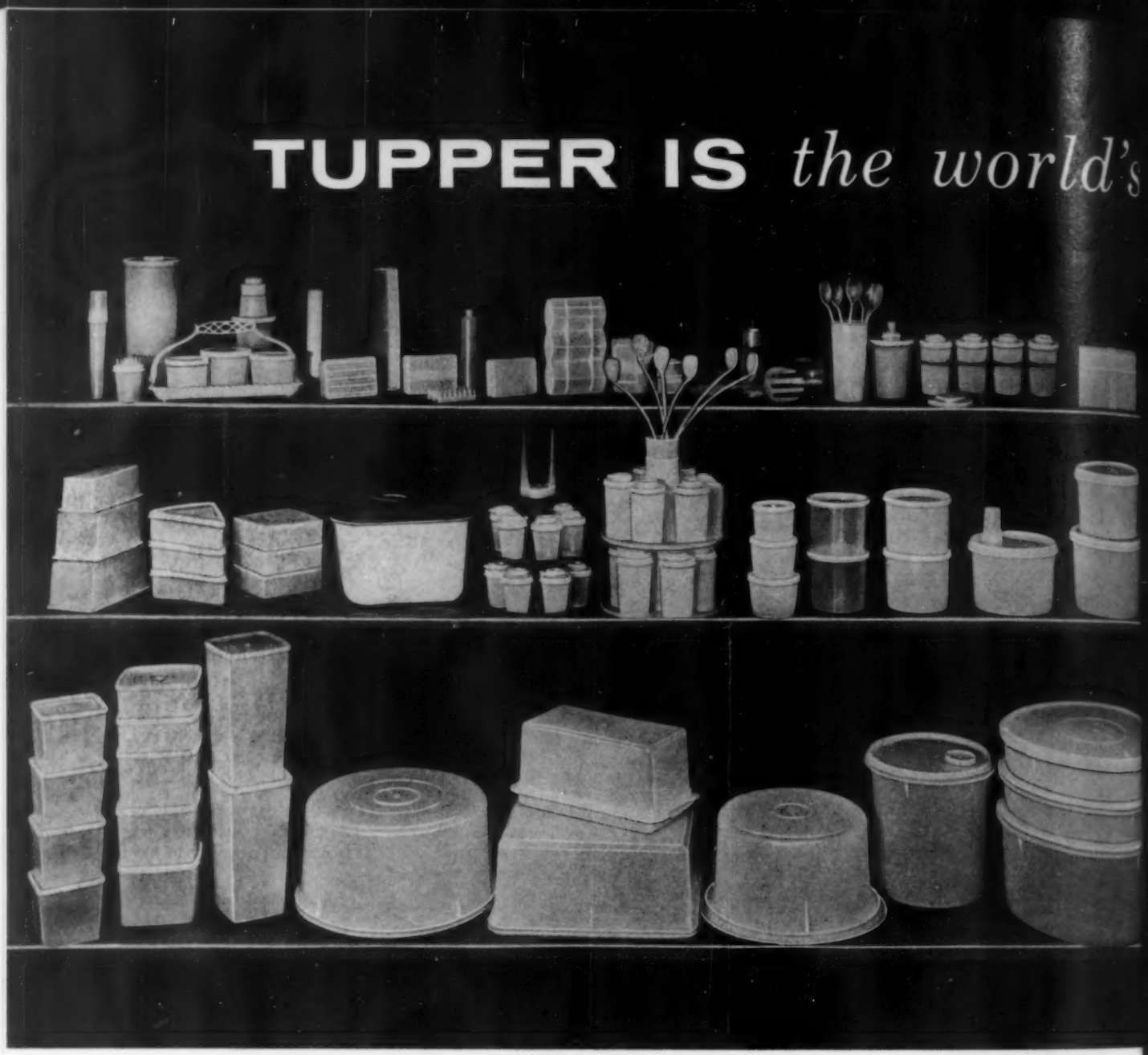
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Plastic bottles, tubes, jars

by J. H. PARLIMAN*

The rise of the plastic squeeze container from a novelty to a general utility package can be traced to several factors: the increased availability of raw polyethylene, lowered material prices, continued popular acceptance of the package, the economies and safety factors inherent in the package and the development of special closures and fitments. The squeeze bottle has progressed from a novelty or specialty item to an accepted package. One evidence of this is the importance which packagers now are attaching to faster and more efficient filling lines.

Spray deodorants and nasal sprays lead in consumer applications of the squeeze bottle. Cosmetics and toiletry applications also include powders, bath salts, lotions, creams, hair preparations, sun-tan liquids and a long list of miscellaneous products. Pharmaceutical applications include medicinal skin lotions; eye, ear and nose preparations; an enema liquid; prescription hair lotions; liquid sweeteners and powders, and liquids for veterinary use.

In the chemical and industrial field, hydrogen peroxide, hydrofluoric acid, ink, sulphuric acid, battery electrolyte, plating and cleaning solutions, hydrochloric acid, buffer solutions and mercury typify the products for which polyethylene bottles are used. (See also "Carboys," p. 650.) For the housewife, glass cleaners, catsup dispensers, air fresheners, steam-iron water purifiers, baby nurser bottles and flavoring extracts come in polyethylene bottles. For a man's needs there are squeeze packages for caulking compounds, adhesives, dry lubricants, deicing fluids for automobiles and toiletries in fitted kits.

A number of thermoplastic materials are adaptable to the automatic blow-molding process, the principal method of producing plastic bottles.

Polyethylene is by far the most common material used. A broad range of favorable properties explains its popularity—excellent chemical inertness, mechanical properties resulting in very tough, flexible packages and thermal properties allowing package use over a wide temperature range. No plasticizers or additives are used. The material is light in weight.

Cellulose acetate has been blown into nearly unbreakable, generally rigid bottles, although some flexibility can be attained through proper design and specification of thin-wall sections. Water clarity is possible. Excellent resistance to aliphatic hydrocarbons makes acetate bottles suitable for packaging lubricating oils, but they are not recommended for products having a water or alcohol base.

Cellulose acetate butyrate is quite similar to cellulose acetate, giving bottles of greater toughness and of equal inertness to aliphatic hydrocarbons. The presence of odor under some conditions must be considered. So far, production volumes are restricted by limited demand.

Polystyrene makes a lightweight, rigid, crystal-clear bottle. Annealing may be necessary for some shapes and end uses. Jars of this material are being used chiefly for cosmetics.

Trifluorochloroethylene bottles have been blown in limited quantities for special applications. This material gives particularly excellent chemical resistance and permeability properties. Its biggest drawback is price which must be reckoned in dollars rather than cents.

Design factors

The factors which must be considered in the proper design of a blow-molded plastic package are many and involved so that any general discussion must be quite limited in scope.

The ideal blown bottle shape has a circular cross section, is neither too tall and slender nor short and squatty. Tapered round and certain oval forms are also preferred shapes. Square or rectangular designs introduce special problems. Acute-angle corners and shoulders should be avoided when possible, as they are difficult to "fill out" and can produce thin corners.

Improvements in manufacturing methods have led to better wall-thickness distribution. This is particularly true of the oval bottle where wall thickness at the narrow ends has been thinner than in the center.

Proper thread and neck design are of great importance. Thread design has been discussed in some detail in the literature.[1] Threads other than the design used on common glass bottles are often used in plastic for strength and other considerations and buttress-type threads are often seen.

For specific information on labeling and decoration, see p. 296, "Marking Plastic Containers," for information on bottle filling, see p. 474, "Squeeze-Bottle Packaging."

Closures for polyethylene bottles are of two kinds—threaded and friction fit. The greatest percentage of threaded types has been molded of phenolic or urea, with melamine, polystyrene and polyethylene also in common use. The actual seal is made with the closure liner, very often of vinyl-

(*This article continued on page* 290)

*Manager, Product Development, Plax Corp., Hartford, Conn.



PHOTO COURTESY PLAX CORP.

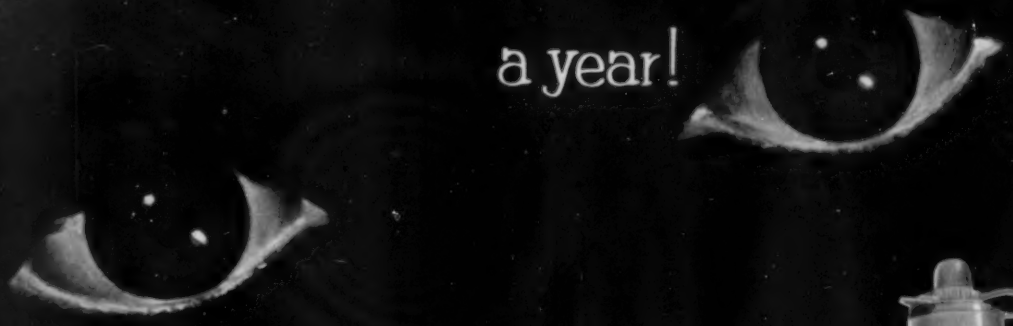
Polyethylene bottles are becoming increasingly important as containers in the drug and pharmaceutical field, because they are safe, light in weight and lend themselves to functional dispensing.

[1] See "Design Factors in Blow-Molded Plastic Bottles—I," by J. H. Parliman, MODERN PACKAGING, Oct., 1951, p. 111.

she spends

$64 billion

a year!



After the rent, taxes, utilities, and other basic fixed expenditures are all taken care of, American women spend $64-billion on such discretionary items as soaps, cosmetics, perfumes, specialty food items and hard goods. In round figures, that's about 80 percent of all such items bought each year.

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5.


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INCO JAR, BAKELITE POLYETHELENE

Double-wall jar is injection molded of polyethylene. It is popular for fitted traveling cases because it is non-shattering.



PHOTO COURTESY PHOENIX PRODUCTS CORP.

These polyethylene tubes and bottles are produced by a combination of forming processes—extrusion, injection molding and heat sealing. The multicolor printing on these containers is excellent.

coated pulpboard or cork. Homogeneous polyethylene or polyisobutylene-polyethylene mixture liners are used in special instances. Liners are ordinarily not required for polyethylene closures. Special-design polystyrene closures without liners have also become common.

The closure of a polyethylene bottle should have full thread depth for optimum fit between closure thread and neck thread. Closures molded of thermosetting materials which have been completely cured in the mold and have to be unscrewed to be removed from the mold are preferred over stripped caps. Caps stripped from the mold by force are apt to have a shallower thread and greater dimensional fluctuations, although satisfactory closures of polyethylene have been produced by this method.

Polyethylene closures with buttress-type threads provide greater gripping power than glass-type threads, yet they can be applied or removed with no greater torque. Filled gallon-size polyethylene bottles fitted with buttress-threaded polyethylene closures have withstood 60-ft. drops onto concrete without popping their caps.

Sometimes friction-fit closures (without threads) are used on polyethylene bottles. This type closure has become less popular.

Spray bottles employ special fitments consisting of a plug and tubing, which are most often made of polyethylene. The function of the spray package results from a squeeze which compresses the air in the bottle and raises the liquid level in the tube. At the same time, air passes over the top end of the tube, creating a vacuum to assist the rise of liquid. In the mixing chamber of the plug, air and liquid blend to produce a fine spray.

A wide variety of spray plugs in sizes to fit various bottle-neck diameters is offered and it is possible to obtain fitments that will produce a vertical, horizontal or 45-deg. spray.

The "controlled drop" dispenser plugs, with steel-ball control valves are widely used for the dispensing of eye and ear drops and liquid sweeteners. They are available as stock items and also may be custom designed for specific end uses, with specifications as to drop size and pressure required on the bottle to produce a drop. Liquid viscosity and surface tension will affect the drop-dispensing properties of these plugs.

A number of spray-plug designs have been developed which friction fit inside the bottle neck, screw onto the bottle like a regular closure or friction fit over the outside.

Most tubing in current use is of the common cylindrical type, with interior diameters from 0.022 to 0.082 in. Final selection of plug and tube is determined by trial. A rather large number of variables governs the spray action, including plug orifice diameter, tube inside diameter, liquid level, liquid viscosity and liquid surface tension. Removal of the spray tube from the assembly leaves a package from which a liquid can be squirted or dispensed drop by drop.

A significant development is the patented dispenser that employs a well type of construction for dispens-



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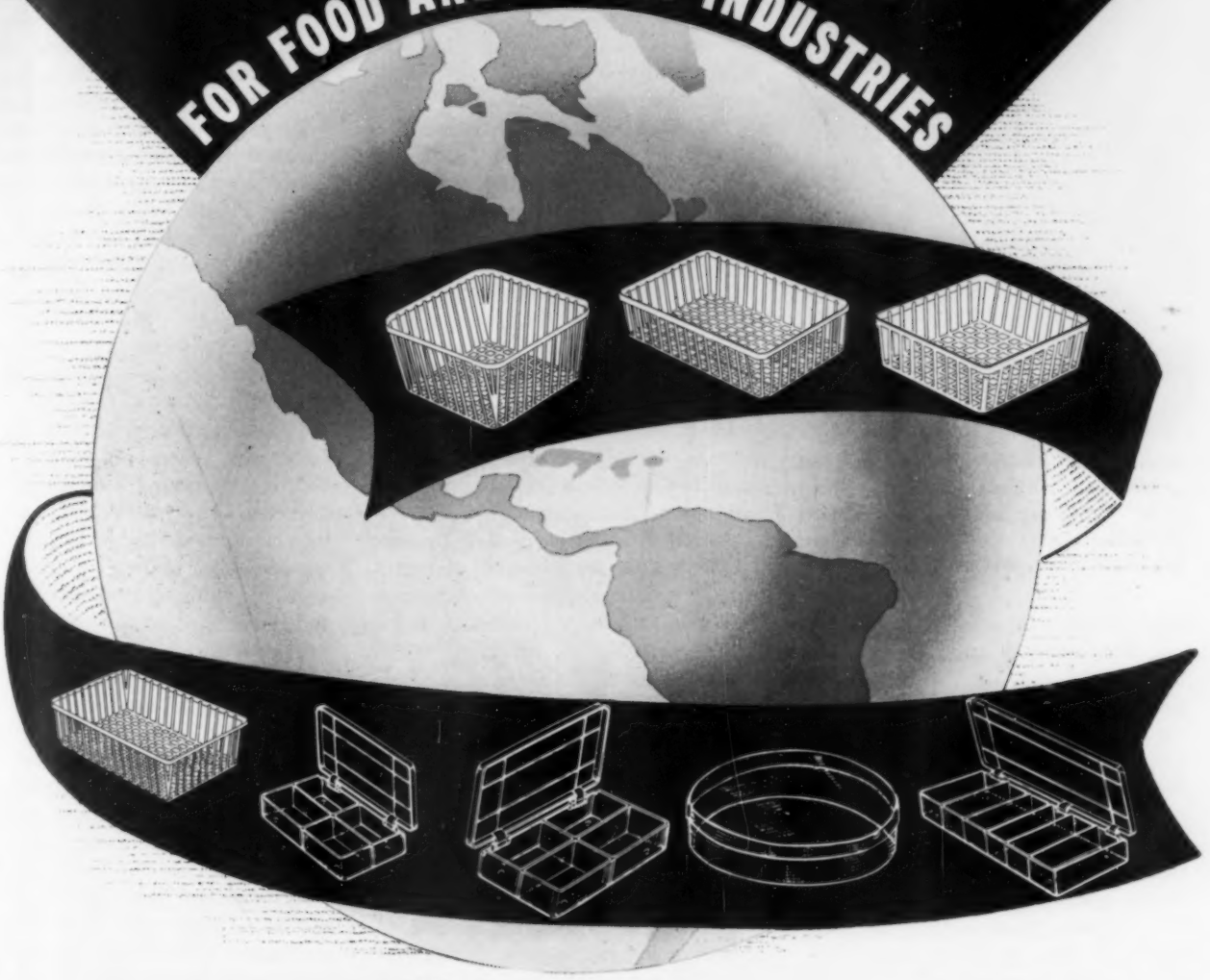
Family of polyethylene containers is made in sizes from 6 to 64 ounces. Containers have locktight lids and are designed for ice cream, drugs, cosmetics, household and numerous other products.

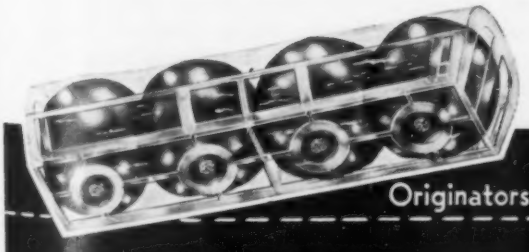
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Two styles of gallon polyethylene jugs: one for easy carrying; the other for easy filling and dispensing.



POLYETHYLENE TUBE, BRADLEY CONTAINER CORP.

Merthiolate antiseptic is dispensed gently and without waste by "Unidrop" container adopted for Bullard industrial safety kits. Two sizes are packaged: 2 cc. and 4 cc.

ing a closely controlled volume of liquid. The bottle is squeezed until the liquid level rises to the top of the neck. When pressure is released, the excess is drawn back through the tube, leaving an exact quantity of liquid in the well.

Polyethylene bottles do not react chemically with most products, so this factor is not usually of much concern to the packaging engineer. The material has no solvent at room temperature and the chemicals which adversely affect it are few in number and not often components of packaged products. However, this is not true of some other blow-molded bottle materials like polystyrene and the cellulosics. Here, chemical resistance must be thoroughly checked.

Permeability of liquids through the walls of polyethylene bottles usually takes place without adversely affecting the bottle itself. The rate of permeation of both liquids[2] and gases varies greatly, depending on the size and polarity of the permeating molecules, temperature and other factors. However, most of the more common products which would be packaged in polyethylene bottles have sufficiently low permeation rates to satisfy package requirements. But routine permeability testing is always wise.

The various plastics often provide totally different permeability properties for a given product. For example, while water- and alcohol-base products are commonly packaged in polyethylene, they are not often packable in cellulose acetate. On the other hand, the lower-boiling aliphatic hydrocarbons can be packaged in cellulose acetate butyrate but permeate rapidly through polyethylene.

Side-wall collapse sometimes occurs in flexible plastic bottles. This is an infrequent phenomenon that often can be corrected by proper package design. Wall collapse is commonly caused by simple absorption of oxygen into the liquid from the air space above the liquid, which results in a partial vacuum. Steps can be taken to avoid or minimize this: Choose a bottle shape that reduces this tendency—a round bottle should not be selected—specify the greatest side-wall thickness possible for strength; fill container, minimizing air space.

An interesting recent development has been the introduction of extrusion-fabricated bottles, which have a disk-shaped bottom piece heat sealed to the body of the container. Thin-walled versions of this type of bottle have demonstrated excellent characteristics as a dispensing package for powders as well as liquids. A well-known brand of baby talc, for example, is being packaged in this lightweight, nonbreaking, nice-to-handle polyethylene container. In body, shoulder and neck design this type of bottle has a construction similar to that of a collapsible tube. It also employs the same well-developed method of decoration used for metal tubes, that is, the cylindrical body is mounted on a mandrel and offset printing is rolled on.

Tubes and jars

A number of different types of plastic tubes have been developed in recent years. These containers, in general, are sealed by heat sealing the open end to form a toothpaste-tube type of bottom. Machines are now available to fill and seal these tubes at relatively good production speeds. Plastic tubes are breaking into the retail market as packages for paste, glue, finger paint, cosmetics and for food preparations, such as cocktail spreads, cake decorations and synthetic sweeteners. The polyethylene tube has come rapidly to the fore, and a number of examples of excellent tube decoration are being produced by offset printing the tubes while they are mounted on mandrels. Vinyl tubes are also important in this field and development work with saran tubes is known to be under way. Plastic tubes lack the desirable dead-fold properties of the metal collapsible tube, but on the other hand, offer a bellows action that lends itself to no-drip dispensing. In general, a similar wide range of choice in closures and dispensing fitments available for metal tubes is also adaptable to plastic tubes. Plastic tubes do not at this time make a bid for many of the products traditionally packaged in metal collapsible tubes, but a growing field of applications can well be anticipated for plastic tubes, especially in some areas where metal tubes may not have been important.

Plastic jars are gaining in use. For travel kits, where weight and breakability are serious disadvantages, they have become standard equipment. For long shipping distances, too, they offer considerable savings potentials in over-all shipping-container weights and reduced protective-packaging and damage costs.

Plastic jars are currently produced by injection molding with single walls and are also made with hollow walls using a heat-sealed bottom. The double-walled style has broken into the cosmetic field in some quantity. Several leading cosmetic houses are putting out a special line of toiletries using both the plastic bottle and jar, not only for the savings that can be anticipated over the long run but for the merchandising values of the new designs in an intensely competitive market. Jars are now being produced by the blow-molded method, too. They are said to offer advantages similar to the injection-molded container and have special freedom of design.

Vials. A complete line of molded vials is available in several plastic materials for various applications. Fitted with caps of the same material, they reduce raw-materials requirements.

[2] See "Shelf Life in Polyethylene," MODERN PACKAGING, Oct., 1954, p. 145.



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Lusteroid is strong, rigid, resilient and shatterproof. This eliminates need for protective packing and partitioning—cuts packing costs.

PRODUCT VISIBILITY

Lusteroid is crystal-clear, affording full display of your product while protecting it.

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Your label can be printed as an integral part of Lusteroid containers, reducing labeling expense and creating a more attractive package.

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Lusteroid containers come in standard sizes from ¼ to 1¼ inches in diameter and standard lengths up to 6 inches. They are cylindrical in form with round or flattened end and with straight, curled or threaded necks. Puffers are also available in ⅝, ¾ and 1 inch diameters with threaded neck and hexagon-shaped screw top. Smaller sizes with gelatin caps.

Closures

Cork, friction or slip-on, polyethylene and metal screw-cap closures are available.

Typical Applications

Following are typical products economically packaged in Lusteroid containers:

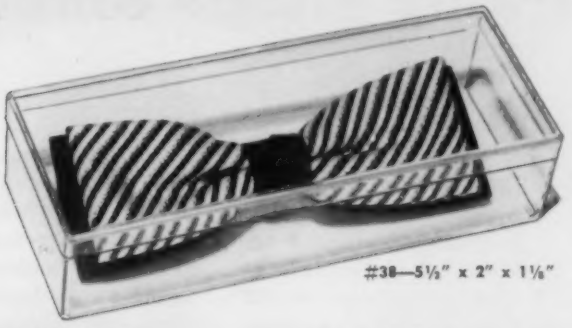
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Increase your sales volume by adding to the appeal of your products with better packaging.

Many alert and aggressive merchandisers are using BRADLEY PLASTIC BOXES to enhance the sales-potential with these re-usable containers.

A large assortment of polystyrene boxes are available without mold cost; or can be designed to meet your specific need, . . . with and without hinges; with covers; variety of sizes and shapes . . . we invite your inquiry or send us your problem. Join our "Box-of-the-Month" Club!

On large volume orders, we will build a mold to your specifications, at no cost to you.



#40—5⅝" x 1¾" x ½"

FREE:

Completely illustrated catalog showing more than 100 different plastic boxes . . . Write on your company letterhead . . . no cost or obligation.



BRADLEY INDUSTRIES, Inc.

1652 North Damen Avenue
Chicago 47, Illinois

"Suppliers of the world's largest assortment of Rigid Plastic Boxes"



For:
Confectionery
Notions
Novelties
etc.

For:
Cosmetics
Toys, Christmas
Novelties
etc.

THINK OF — CELLUBOX

TRANSPARENT ROUND BOXES

For:
Pajamas
Underwear
Lingerie
etc.

Custom designed and fabricated around the product to compliment the individual item . . . yet CELLUBOX transparent round boxes are inexpensive. Available with cardboard or transparent tops . . . attractively printed in any number of colors.

Cardboard or metal bottoms.
Decorative Accessories.

Send us a sample of your product. We'll return it in a custom designed CELLUBOX. No obligation.

AMERICAN CELLUBOX CORP.

27-03 Bridge Plaza North
Long Island City, N. Y.

Marking plastic containers

by ARTHUR N. SKEELS*

What the packager should know about printing on plastic containers is not so much the technical aspects of the various processes—for that is the business of the specialist in marking. Rather, the packager should understand the advantages and limitations of the processes from a cost, design and appearance point of view.

To achieve bold but tasteful product and brand identity on plastic containers, the packager must rely primarily on the skill and inventiveness of the specialist in marking because too many factors are variable—equipment, techniques, plastics and marking materials.

From experience, it would appear that too little attention is given by the mold-design engineer in the planning phase to the last process to be performed on a molded container—decorating the package surface.

To prevent skid and to maintain positive contact between the printing head and the package surface, holding jigs are used. For hot stamping flexible bottles, these jigs correspond in essence to the contour of the *flattened* bottle. But in silk screening, where the bottles must rotate against the flat screen, these jigs must be accurately machined for proper contact.

Difficulty arises when over- and under-sized bottles from the same lot are set into the holding fixtures. These defects are common in packages molded in multi-cavity molds—less common in single-cavity moldings. Apparently, the dimensional variances occur whether the package is compression-, injection-, or blow-molded or cast.

One simple way around this is to number the cavities in the multiple-cavity mold whether or not care is taken in hobbing, polishing, gating or machining the cavities. For one molder this simple procedure meant the saving of a good percentage of the pieces of a 250,000 run. The dimensional variations from one cavity to another made it impossible to decorate the pieces without separating them according to cavity number and running them accordingly. Once he had numbered the cavities, he was not only able to salvage the already molded parts at little extra expense, but also he had a guide for molding the entire million-piece run whereby the pieces were separated by cavity number at the time of molding at no additional expense.

Consider the costly problem of unnecessary extra handling. Often by simply changing a contour here or putting a flat surface there, much valuable time and money can be saved. To cite a particular instance, a molder of one-million dispenser tops could have saved up to $4.50 per thousand pieces in his decorating costs and a considerable amount of time in getting the product on the market if he had changed his design in only a slight way. In another instance, excessive use of mold lubricants precluded the possibility of decorating by any method without thoroughly cleaning the pieces.

The design engineer also must bear in mind that, regardless of the type of plastic used or the design of the container, some peculiarity of the decorating process may work against the most economical or efficient operation. For example, in hot stamping where all containers must be rigidly supported unless each piece comes fairly close to matching its nest, the pieces may crack, break or appear crushed under the pressure used. In some cases this can be minimized. Thin-wall sections such as occur around abrupt edges and corners do not have the necessary resiliency to resist deformation. By limiting the size of the stamping die so that it fits well inside the area defined by the edges, it is possible to mark this type of container satisfactorily. Peculiarities in the silk-screening and offset processes may produce slurs and poor outline of character in the decoration as well as omitting or weakening the design.

With an understanding of the individual processes, it may be that a more-legible, lower-priced package will result if dual processes are used when both front and back panels are to be decorated. It often proves practical to silk screen a design on the front panel—where heavily-inked areas must carry the weight of brand-name recognition—and to print by offset the directions on the back panel—for greater legibility.

Decorating processes

Rigid and semirigid plastic containers can be labeled by the following means: hot roll-leaf stamping, silk screening, offset printing, filling in, paper-adhesive labels, decalcomania, engraving, rubber stamping and mask

* President, Art Decorating Co., North Bergen, N. J.



DESIGN, DESIGN ASSOCIATES

Sturdy molded-in lettering helps strengthen masculine appeal of this polyethylene bottle.



SILK SCREENING, ART MARKING SPECIALISTS, INC.

Silk-screened bronze figures provide eye-catching solid areas of color for white polyethylene bottle.



Look into

TRI-STATE "SHOW WINDOW" PACKAGING

THE WORLD'S GREATEST ASSORTMENT OF CRYSTAL-CLEAR RIGID PLASTIC BOXES

TRI-STATE PLASTIC MOLDING CO., Inc.

HENDERSON, KENTUCKY • TELEPHONE: 9061-2-3

NEW YORK:
12 E. 41st St., MUrray Hill 3-8743

CHICAGO:
176 W. Adams St., FRanklin 2-5367

DETROIT:
18401 E. Warren Ave., TUxedo 5-5500

ST. LOUIS:
1089 Francis Place, DElmar 1089

SAN FRANCISCO:
1355 Market St., KLondike 2-1963

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NO. 32 Diam: 2¾" x ⅝" deep



NO. 10 Diam: 3⅛" x 1¹⁵⁄₁₆" deep



NO. 12 Diam: 3²⁵⁄₃₂" x 2⅛" deep
(Plastic Snap-on Cover)



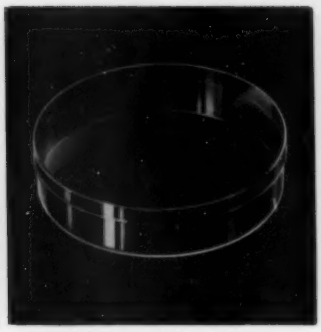
NO. 15 Diam: 3⅝" x 1¾" deep



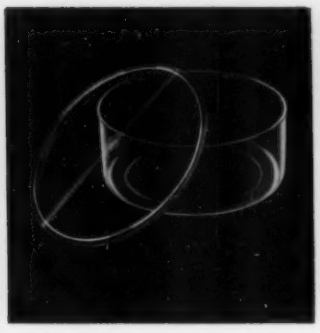
NO. 21F Diam: 3¹⁵⁄₁₆" x 1⅛"



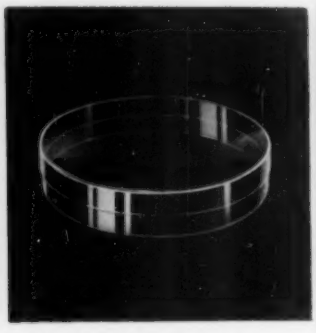
NO. 190 Diam: 5⅛" x 5¾" deep



NO. 56 Diam: 4¼" x ¾" deep



NO. 240 Diam: 8" x 3" deep



NO. 170 Diam: 6" x 1" deep



NO. 175 Diam: 6" x 1½"



NO. C189 Diam: 7¹⁵⁄₁₆" x 7¾" deep
(Red or Yellow Lids Only)



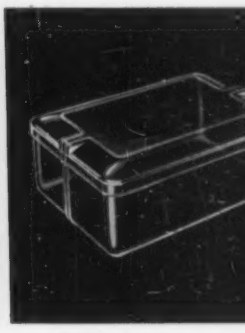
NO. 09 Diam: 3¾" x 3¾" deep
(89MM Metal Screw Closure Not Furnished)



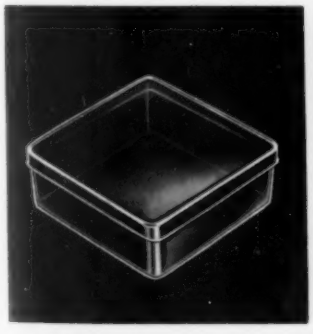
NO. 02 1⅞" x 1¹⁵⁄₃₂" deep
(53MM Metal Screw Closure Not Furnished)



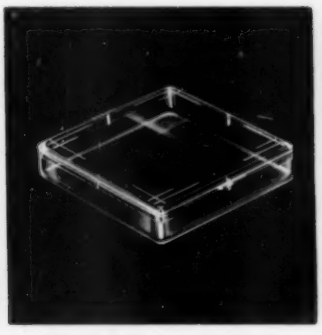
NO. C25 3⅜" x 4¹⁵⁄₁₆" x 2⅜"



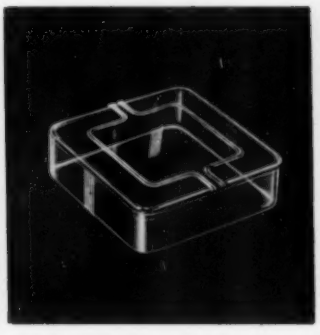
NO. C49 4¾" x 6¾" x



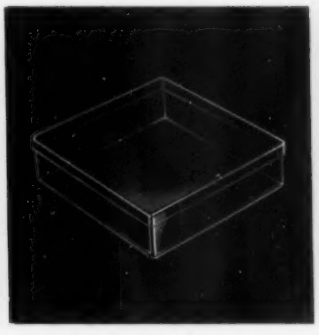
NO. 06 2⅞" x 2⅞" x 1⅛"



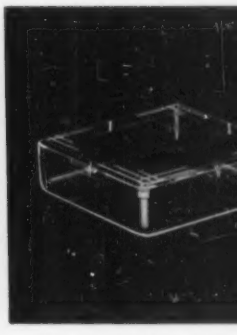
NO. 155 4⅝" x 4⅝" x 1¼"



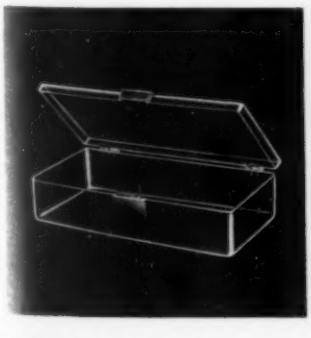
NO. 92F 4⅝" x 4⅝" x 1¼"



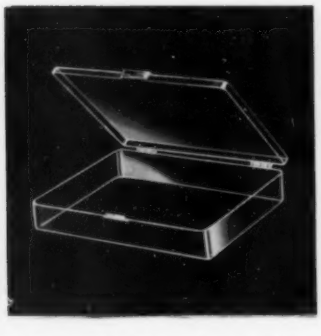
NO. 62 5" x 5¼" x 1⅝"



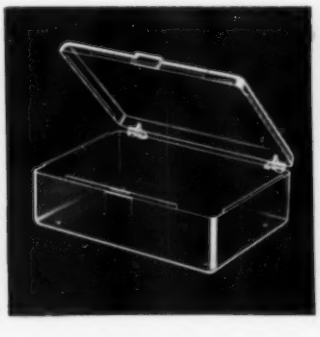
NO. C91 4⅝" x 4⅝"



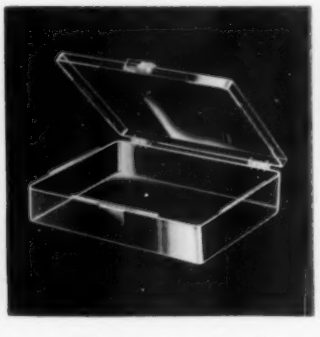
NO. 505 4½" x 1¹¹⁄₁₆" x ⅞"



NO. 510 3¹⁵⁄₃₂" x 2 ¹⁵⁄₃₂" x ²⁵⁄₃₂"



NO. 14 3¾" x 4¹⁵⁄₁₆" x 1¼"



NO. 575 5" x 7" x 1¼"

There's a
sales, cut
range of
specificat
—greater



NO. 21F Diam: 3 11/16" x 1 1/16" deep



NO. 210 Diam: 3 11/16" x 1 3/16" deep
NO. 211 (with Polyethylene Lid)



NO. 42F Diam: 3 11/16" x 2 3/16" deep



NO. 415 Diam: 3 25/32" x 3 3/16" deep
(Rigid translucent with clear lid)



NO. 175 Diam: 6" x 1 1/32" deep



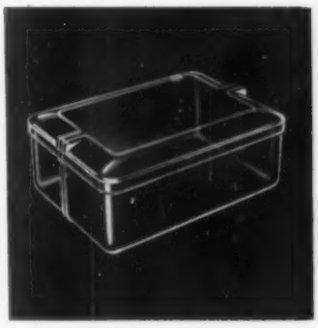
NO. 180 Diam: 6" x 2 1/32" deep



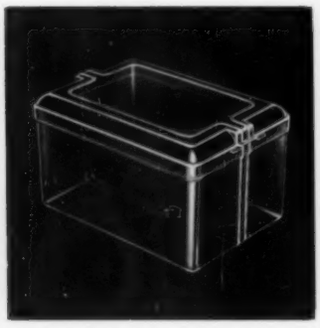
NO. 250 Diam: 10" x 3 1/32" deep



NO. 24 2 1/16" x 4 3/16" x 1 1/16" deep
NO. 54 2 1/16" x 4 3/16" x 3/16" deep



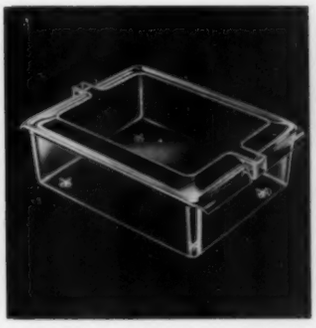
NO. C49 4 3/16" x 6 3/16" x 2 3/16"



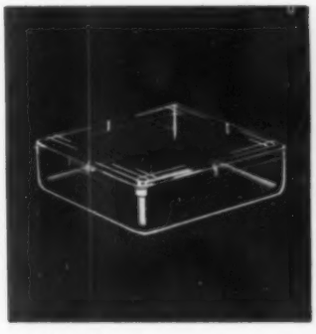
NO. C79 5 1/4" x 7 3/16" x 3 3/16"



NO. 195F 7 3/16" x 10 3/16" x 3 3/16"



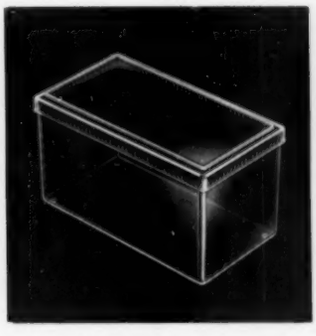
NO. 395F 10 3/16" x 12 3/16" x 3 3/16"



NO. C91 4 3/16" x 4 3/16" x 1 3/16"



NO. 160 2 3/16" x 8 3/16" x 2 3/16"



NO. 102F 4 3/16" x 2 3/16" x 2 3/16"



NO. 82 3 3/16" x 6 13/16" x 1 3/16"

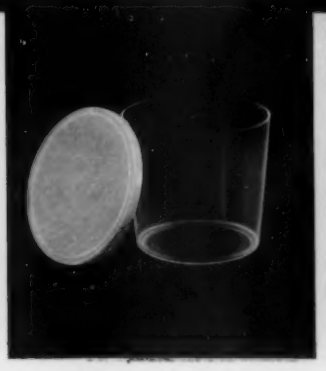
There's a Tri-State Rigid Plastic Box to fit your product, build your sales, cut down on your packaging operations. Choose from our wide range of stock sizes and shapes, or let us mold large quantities to your specifications. Package in plastic – rigid plastic – for added protection –greater point-of-sales appeal–bonus utility boxes for your customers.

On special orders in large quantities, all of these shapes and sizes can be molded in colors, both opaque and transparent.





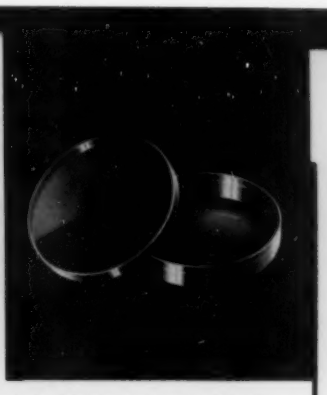
NO. 420 Diam: 3 11/16" x 2¾" deep
NO. 421 (with Polyethylene Lid)



NO. 425 Diam: 3 27/32" x 3 3/16" deep
(Polyethylene Lid Only)



NO. 72 Diam: 3 7/16" x 2 5/16" deep



NO. 52 Diam: 4 5/16" x 1 3/16" deep



NO. 84 2 5/16" x 4¾" x 1⅛" deep



NO. C40 Diam: 3¾" x 2 13/16" deep



NO. C50 Diam: 3 11/16" x 5¼" deep



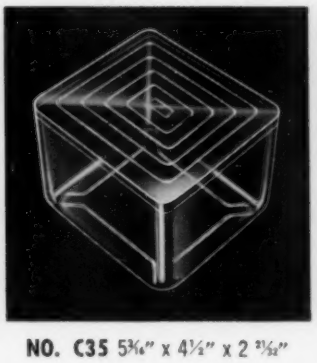
NO. C70 Diam: 4 5/16" x 5½" deep



NO. 29F 3¾" x 3¾" x 3"



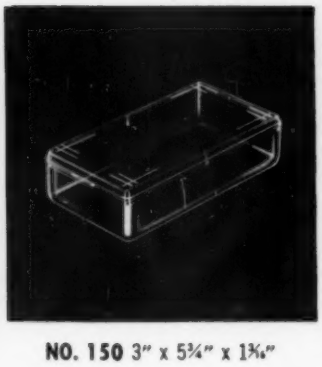
NO. 49F 3 11/16" x 7½" x 3"



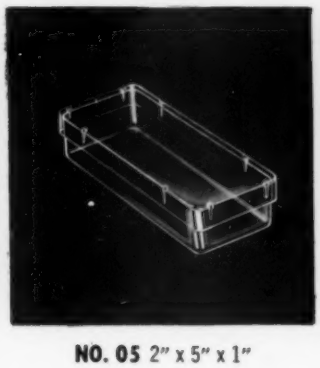
NO. C35 5 3/16" x 4½" x 2 27/32"



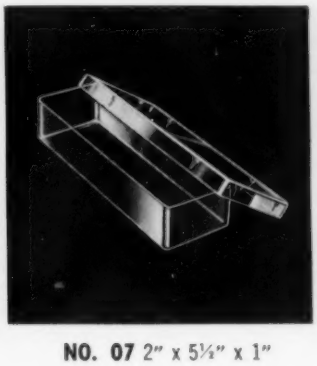
NO. 30F 4" x 5 3/16" x 1 3/16"



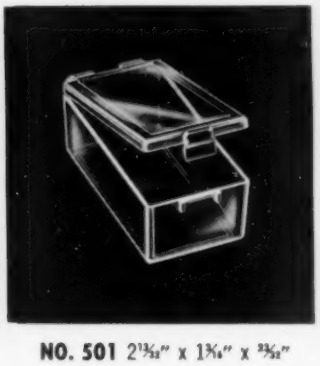
NO. 150 3" x 5¾" x 1 3/16"



NO. 05 2" x 5" x 1"



NO. 07 2" x 5½" x 1"



NO. 501 2 13/32" x 1 3/16" x 23/32"



NO. 515 4 11/16" x 3 5/16" x 5/16"



NO. 600 6 3/16" x 9½" x 1½"



NO. 650 6 3/16" x 9½" x 1½"



NO. 700 9 3/16" x 13 1/16" x 2"

Write for price and packing list.


Elsie PUTS A BIG CHEESE IN ITS PLACE
Borden's
Bow Ties "grow" on trees!
McCORMICK
NO MORE SALES THREADACHES...
RIGID PLASTIC BOXES
Write a SWEETER Sales Story for Welch's
Tri-State
BATES SELLS GOOD GROC
in TRI-STATE
Everything...
LOOKS Better
SELLS Better
Packaged in TRI-STATE
Rigid Plastic
Tri-State RIGID PLASTIC BOXES give...
HABIT
U. S. LINE reels
with TRI-STATE
NO OILS SOIL
in this Tri-State Rigid Plastic Box
BURNDY Finds A PLACE FOR EVE
In This TRI-STATE



Look into

TRI-STATE "SHOW WINDOW" PACKAGING

THE WORLD'S GREATEST ASSORTMENT OF CRYSTAL-CLEAR RIGID PLASTIC BOXES

TRI-STATE PLASTIC MOLDING CO., Inc.

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DETROIT:
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ST. LOUIS:
1089 Francis Place, DElmar 1089

SAN FRANCISCO:
1355 Market St., KLondike 2-1963



Quality, formerly an elusive item in printing on plastics, has presently reached a degree of excellence which accounts, in part, for wide acceptance of plastic containers. Polyethylene bottles above represent three most widely used printing methods. Starting from left: hot roll-leaf stamping, two-color silk screening, single-color silk screening and offset.

spraying. Each process has its own characteristic finish and is chosen on the basis of desired appearance of end product, cost, length of run, etc. However, the processes are specialty operations and the decorator is the best guide in the final evaluation.

Of the above-mentioned processes, hot roll-leaf stamping, silk screening and offset printing are the most commonly used techniques of integral labeling. In the examination of a decorated package, hot roll-leaf stamping appears and feels depressed; silk screen feels raised on the plastic surface because of the heavy laydown of ink; offset is flush with the printing surface, and filling in is distinguished by its greater depth of impression.

Hot stamping and silk screening costs are about equal, although one or the other may have the advantage in individual cases. Determining factors are the area of the design (which defines the quantity of roll leaf consumed) and the number of passes through the press each container requires. Each complete design or each color of a design requires a separate pass. The same is true of silk screening with the exception of front and rear labeling of round packages, where the container is rotated against the screen and both labels applied in a continuous operation. Round containers may be printed in like manner by offset. However, the offset process is slightly more expensive until you get into multicolor work.

Cost of both offset and silk screening is largely dependent on the design. For front and back labeling by these processes, another factor influencing cost is the container shape—because elliptical or rectangular packages require separate passes. Otherwise the shape of the container is a limiting factor in plastics marking by offset, hot stamping or silk screening only insofar as it complicates the construction of holding fixtures.

Hot stamping is a versatile and relatively inexpensive decorating method embodying quality, wear resistance, productivity and ease of handling. A pigment-colored leaf or foil (cellophane or acetate-film backing) made in any and all colors, is deposited under heat, pressure and carefully controlled time to release the pigment onto the plastic container. The pigment actually becomes homogeneous with the basic plastic material. Unfortunately, leaf which functions on one type of plastic will not work on all types. It is, therefore, essential that the leaf be carefully chosen. Heat, pressure and dwell time are also carefully controlled to achieve the best bonding and highest productivity and lowest cost. Stamping equipment has performed at a rate as high as 4,500 and as low as 60 pieces per hour.

Since initial investment for properly machined dies is relatively high, this process is not often used for short runs. Length of run is also the chief factor in determining the choice between brass and steel dies. Whereas brass dies cost, say $60, steel dies will run around $100. Brass is used to mark up to 100,000 rigid or semirigid thermoplastic containers and up to a half-million polyethylene bottles. For longer runs, detail is lost and steel dies are recommended. Steel has further advantages in that breakage is much less than with brass dies and it can be used to mark those thermosetting materials that lend themselves to hot stamping.

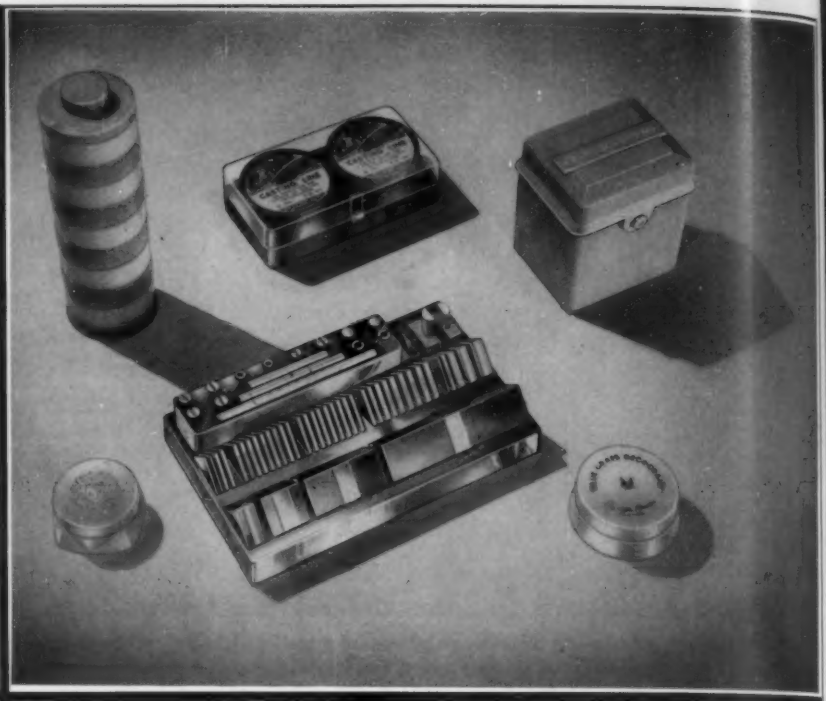
In this hot-stamping operation, all containers must be rigidly supported. Hinged polystyrene boxes may be marked after assembly if the hinge opens at least 90 deg., but in any case the "hit" must be made on a solidly backed up surface or the container will shatter. Flexible polyethylene bottles lend themselves very well to this marking operation as properly machined holding fixtures or "nests" control the collapse of the container. However, once a container has been hot stamped, it cannot be reclaimed.

Silk screening is a tried and proved process in the plastic decorating field and can be used to attain quality, wear resistance and fairly good productivity at a reasonable cost on all types of plastic containers. The ability of screened paints or inks to adhere is chemical in nature. Recently developed thermoactive inks and paints which polymerize to an insoluble film —having maximum wear resistance, flexibility, gloss and chemical resist-

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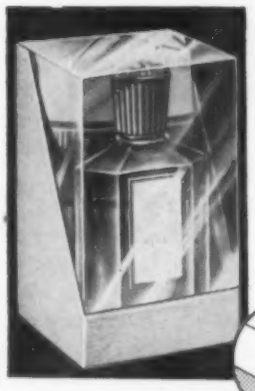
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ance—have brought this process to its present high standard of acceptability.

Two methods are used in transferring the screened design to a plastic container—both involving the use of a rubber squeegee. One is a slower, hand-operated squeegee; the other is a machine-operated squeegee. With the former, productivity ranges from 250 to 500 pieces per hour; with the machine, 400 to 1,000 pieces per hour.

In the use of this process, the problems are the choice of the proper inks or paints, correct mesh of silk screen and choice of photographic film transfer medium (in preparation of the screen) together with the proper consistency of the rubber squeegee. Holding fixtures play a vital part in this process and must be properly designed to avoid blurring during transfer of the design. The process gives a heavy laydown of paint with sharpness of detail. It is not recommended for small, solid text portions (such as instruction copy on the back panel of a container) for the viscous paint is inclined to fill in small letters. Another limitation is that only flat areas can be marked; thus the label must be designed to fall well inside any raised ribs, etc. Compared with the hot-stamping dies, silk screens are relatively inexpensive to prepare. Screened items, however, require approximately 22 min. in a drying oven which accounts for the lower production rates. Qualitywise, the results are comparable and determining factors between the two processes include: length of run; area of design (for hot stamping) versus type of design (for silk screening) since these factors reflect in the cost; reclamation due to copy changes; etc.

Offset printing. Decorating by offset is performed with smoothness, fine detail and delicacy of design which is unobtainable in any of the other processes. Abrasion resistance is good in most instances through the inclusion of proper solvents in the ink which will attack the plastic base. It is recommended that thermosetting plastic packages be covered with a clear coat of lacquer or varnish after printing for permanence. The outstanding virtue of this process is the ability to print multiple colors in a single pass through the press, thus permitting low multicolor decorating costs. The equipment available in the offset printing process is limited and in most instances has been developed by the decorator himself. The problems in offset reproduction are the proper choice of the ink, correct type of rubber or glycerine rollers. Dimensional variation in pieces is also a factor.

Color registration is among the most accurate in the field of plastics marking and offset provides the most satisfactory method thus far of printing halftones on plastic containers. This process has also given good results in topping or "kissing" the surfaces of molded-in lettering. Opaque backgrounds seem to display offset printing to best advantage.

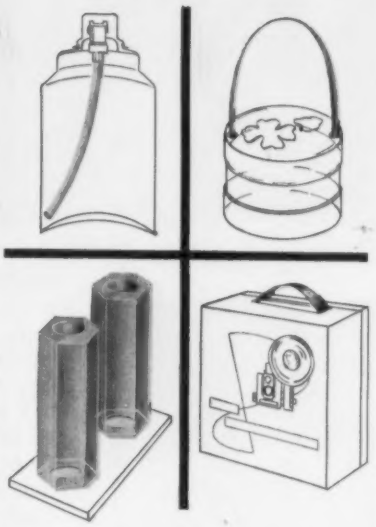
COMPARISON OF PROCESSES FOR PRINTING POLYETHYLENE BOTTLES[1]

Characteristics	*Silk screen*	*Hot stamping*	*Offset*
Permanence	Good	Good	Good
Colors	All	All	All
Metallic effects	Fair	Good	None
Multicolor			
Appearance	Good	Good	Fair
Practicality	Poor	Fair	Good
Require separate pass for each color	Yes	Yes[2]	No
Registration	Fair	Fair	Good
Production speeds	Good	Good plus	Fair
Size limitations	None	None	None
Holding-jig requirements	Simple to difficult	Difficult	Simple to difficult
Laydown of ink	Heavy	Medium	Light
Appearance			
Small type	Fair	Fair	Good
Heavy designs	Good	Good	Lack of opacity

[1] This chart is intended only to supply a rough definition of some commercial methods of integrally marking polyethylene bottles. Certain conditions will alter this rough evaluation. In any case, your decorator is the best guide.

[2] Mechanical set-ups involving multiple stamping heads in series have converted hot-stamping multicolor work into practically an automatic operaton, especially on long runs.

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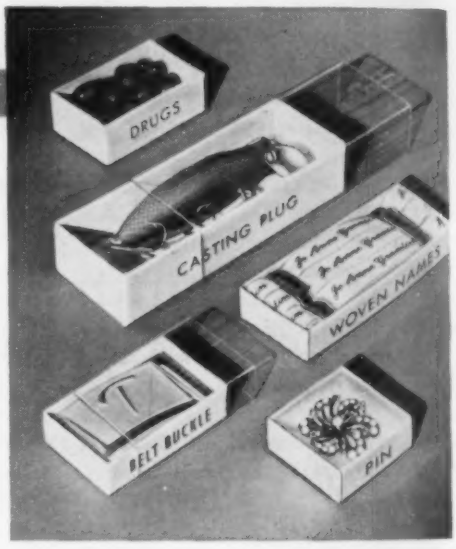
CONTAINERS

TULOX transparent containers are the world's most practical display packages. They provide the transparency of glass at about 1/10 the weight. They are shatterproof, and very strong, affording maximum product protection. They are low in cost, yet expensive in appearance. They are made in a wide range of sizes, with lengths to specification, and are supplied with attractive, snug-fitting, slip-on closures.

Tulox containers can be imprinted for less than the cost of paper labels. Imprinting is limited to 1 color, plus a contrasting background color. Clear or bright red closures are standard, but special colors can be made to order Containers can be supplied with a vent hole in the base, at no additional cost.



SLEEVES

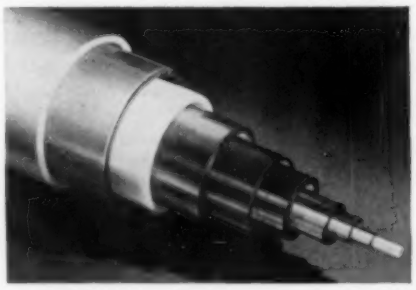


TULOX transparent sleeves, used in conjunction with drawer-type, set-up boxes, make ideal display containers for thousands of products. Because of their seamless, one piece construction, they not only provide clear visibility, but also act to reinforce the cardboard insert—adding strength to the entire package. They are made in many different sizes ranging from 1/2" to 1 1/2" in height, and from 1" to 3" in width, with lengths to specification. No stocks are carried, but a number of section sizes are available for immediate production in any specified lengths.

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TULOX vials are heavily-walled plastic tubes, capped at both ends with durable, tight-fitting telescopic closures. They are shatterproof and completely unaffected by salt water, oil or kerosene. Because of their ability to withstand abuse – Tulox vials are widely used as protective containers for shipping and storing valuable instrument ball bearings, gauges, drills, watch parts, etc. Sizes range from 5/16" to 1 7/8" I.D.

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TULOX tubing is manufactured in two grades—"TT", made from Cellulose Acetate Butyrate, and "A", made from Cellulose Acetate. "TT" grade is available from warehouse stock (clear transparent only) in sizes from 1/8" to 2" O.D. "A" grade is made to special order only.

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Foamed Polystyrene

A new-type moldable foamed polystyrene material, formed by a new process, is providing strong, rigid plastic containers that are as light as cork. Commercial applications of the unusual plastic have now reached the distribution stage. They include a reusable fishing reel and tackle box and a sturdy shipping container for Christmas gift shipments of imported Persian pistachio nuts to industrial accounts.

The new expandable polystyrene selected for these packages offers a combination of qualities difficult or impossible to obtain with other materials. Among them are the extremely light weight of the finished package—an important factor in holding shipping costs to a minimum; the material's efficient protective properties in molded form; the wide decorative and color range available; and the fact that the foam packages can be designed with form-fitting recesses, removable trays and other features which make for greater utility and protection without the need for additional cushioning.

Component sections of the new packages are produced by means of a modified compression-molding process used in handling the expandable polystyrene material. Introduced into the dies in the form of small beads, the plastic is heated under pressure by injecting steam into the closed mold cavities for a brief period. This application of heat causes the polystyrene material to "grow" within the mold, filling out to the exact contours of the mold cavities and providing a cellular structure which imparts strength and light weight to the finished piece while forming a vapor barrier. The mold is cooled briefly before removal of the parts from the press.

The relative density of the finished parts—in this case, the package components—can be varied over a wide range by modifying the amount of molding material placed in the die. Also of interest is the fact that, when the material is molded, a hard protective outer layer forms on the surface which helps to shield it against damage in shipment and handling.

The new molded plastic container used for the spinning reel set is comprised of two principal parts, including a compartmented base and a hinged lid, which is anchored to the base by a strip of pressure-sensitive plastic tape. The left half of the bottom section is molded with a form-fitting cavity in which the reel nests firmly; the right half includes three compartments for the spinning lures and a small removable tray having three sections for other items in the kit.

The polystyrene plastic container for imported pistachio nuts is molded in two matching halves, each made with two deep recesses separated by a heavy transverse rib. Mating beads and channels along the edges of the halves assure a tight seal when the container is closed. For shipment, the two sections are held together by two strips of pressure-sensitive plastic tape. When the top and bottom are brought together, corresponding pockets form two compartments in which lithographed and embossed metal canisters are nested. Inside these containers, the pistachio nuts are packed in polyethylene bags secured by a metal clip or padded wire fastener.

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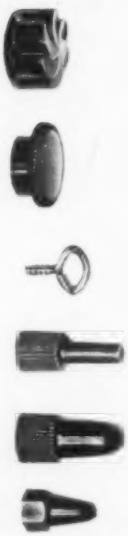


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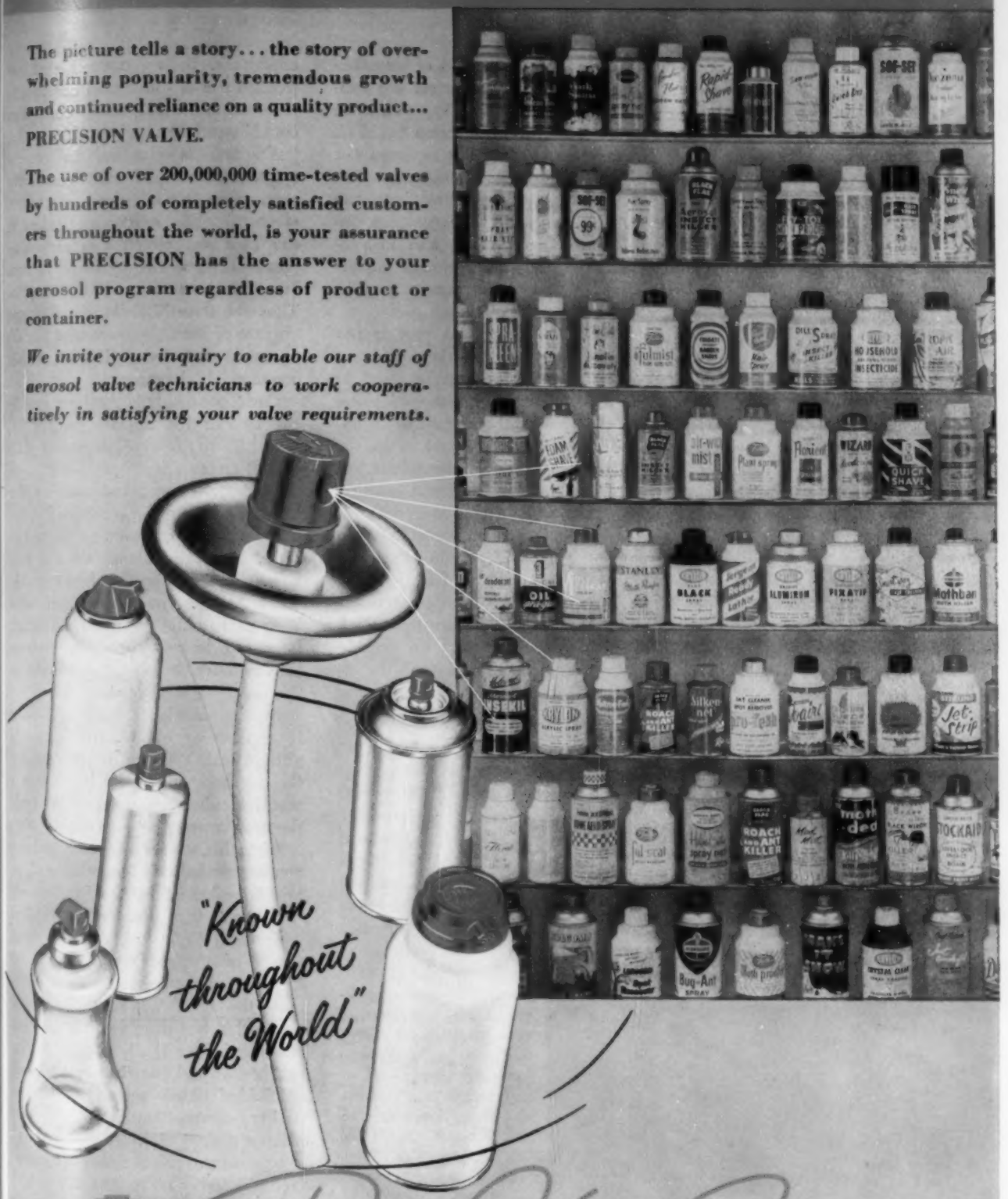
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Packers cans

Cans known in the trade as "packer's" or "sanitary" cans serve the packer as the container in which foods are processed, stored, transported to market and merchandised.

Most food cans are cylindrical—with the wide-mouthed can in use since about 1900. As uniform as these cans may appear, they are available or will be fabricated to meet the requirements of any packer for any food.

"Tin" cans are made of steel sheets coated with tin—about 98 to 99.75% steel and 0.25 to 2% tin. The combination creates a container possessing numerous packaging qualities, foremost of which is strength. With few exceptions, canners purchase cans with one end sealed, from can manufacturers, who fabricate cans and can ends from tinplate produced by steel mills. Some canners fabricate their own cans.

Steel plates used in can manufacture formerly were made by hot-pack rolling, but the base plates used today are made by cold rolling. The steel plates vary in thickness from 0.0061 to 0.0163 in.

In the hot-dip method of manufacturing tinplate, steel sheets are submerged in melted tin. However, since its commercial introduction in 1937, electrolytic tinplate has replaced hot dip in many of its former uses. The electrolytic process allows both the fastest plating and the most even distribution of tinplating; and in providing an even distribution of tinplating, the electrolytic process requires the least amount of tin.

Thus, the electrolytic process has resulted in savings of tin amounting to almost half the quantity used in the manufacture of hot-dipped plate. However, electrolytic tinplate is not used for packing all canned foods.

"Differential coated electrolytic tinplate," having different coating weights of tin on each side of the steel base plate, was used commercially beginning in 1951. Containers made with differential coats of tin have an inside tin coating of sufficient thickness to withstand the corrosive attack of processed foods and an outside coating adequate to withstand the effects of processing and atmospheric conditions. It is estimated that expanded use of differential coated tinplate in fabricating metal containers could extend tin supplies substantially.

Tinplate is classified in several ways. The method most commonly used refers to the gauge and amount of coating. The reference standard is the "base box," which is understood to mean 112 sheets 14 by 20 in. in size, or its equivalent area of 31,360 sq. in. Thus the term "100-lb. plate" means tinplate of such thickness that 31,360 sq. in. of plate weigh 100 lb., within commercial tolerances.

Correspondingly, container specifications call for tinplate coating of, say, 1.25 lb./BB cylinders and 0.25 lb./BB ends.

In modern can manufacturing, the bodies and ends of the ordinary cylindrical cans are cut from sheets of tinplate. The body blanks are fed into a machine called the body maker which notches the corners and turns back each end to form hooks which later are locked together to form the cylinder by being pressed, or "bumped" tightly together.

On the outside of the seam, solder is applied to obtain an absolutely airtight seal. The final step in making the can body is to pass it through a machine called a flanger, which curls the rims outward at each end.

After this, the body is ready to have one end sealed on. The other end, or top, is sealed on by the food canner in the same way after the can is filled with food. Ends are punched from sheets of tinplate by a press and then passed through a machine which curls the rims. Within these curled rims a thin film of rubber composition is applied. Finally, the flanges of the can bodies and the rims of the ends are folded tightly together, with the rubber composition between them making a tight seal.

In this manner, food cans are manufactured today at speeds up to 350 cans a minute on each line.



PHOTO COURTESY DOLE PINEAPPLE CO.

Cans are a major package form, distributing the bounties of farm and sea to mass markets—making foods available in all seasons and at prices everyone can afford.

Primary advantages

Protection. The basic principle of canning is that food is sterilized by heat in airtight containers. Then the foods are held safely against exposure to air, dirt and foreign substance.

Cans are resistant to rough handling and the tin container will withstand considerable shock. Accordingly, hermetically sealed tin cans will protect food effectively in ordinary commercial handling and also against the kinds of attacks involved in civil-defense planning: atomic bombing and biological and chemical warfare.

Not only does the hermetic container protect the food, but being rigid and waterproof, it is adapted to quick and simple washing or sterilization by simple immersion in easily prepared solutions. The internal protection which cans provide, coupled with the ease of attaining external protection, gives canned foods a unique position in meeting the problems of emergency subsistence.

SIMPLIFIED PRACTICE RECOMMENDATIONS FOR SIZES OF CANS

Can name	*Dimensions*[1]	*Volume fill*[2]
2Z Mushroom	202x204	5.45
———	202x214	7.63
6Z	202x308	9.42
———	202x314	10.62
4Z Pimiento	211x200	7.18
———	211x210	10.38
4Z Mushroom	211x212	11.12
8Z Short	211x300	12.34
8Z Tall	211x304	13.48
No. 1 (Picnic)	211x400	17.05
211 Cylinder	211x414	21.28
Pint Olive	211x600	26.47
7Z Pimiento	300x206	11.37
———	300x308	18.03
8Z Mushroom	300x400	21.11
No. 300	300x407	23.71
No. 1 Tall	301x411	25.99
303	303x406	26.31
303 Cylinder	303x509	34.11
No. 1 Flat	307x203	13.21
Kitchenette	307x214	19.17
No. 2 Vacuum	307x306	22.90
No. 95	307x400	27.63
No. 2	307x409	32.00
Jumbo	307x510	40.28
No. 2 Cylinder	307x512	40.95
Quart Olive	307x704	52.62
No. 1¼	401x207.5	22.07
No. 2½	401x411	46.45
No. 3 Vacuum	404x307	37.19
No. 3 Cylinder	404x700	80.54
No. 10	603x700	170.71

[1]In the statement of each dimension, the first digit gives the number of whole inches, and the second and third digits give the fraction expressed in sixteenths of an inch. Thus 211x400 means that the can is 2 11/16 in. in diameter and 4 in. high. These dimensions apply only to regular-type, sanitary or open-top cans.

[2]Cubic inch is used to designate volume fill because it is a uniform measure of volume. (Cubic inches may be converted to fluid ounces by multiplying by 0.554.) Volume fill means the minimum volume of food in the can after processing and cooling.

Convenience. The cylindrical shape of cans facilitates their handling. It is a shape relatively easy to form, convenient to the food processor to handle, label, and store and has won both retailer and consumer acceptance.

Square cans, used for a few products, are not so popular because their processing and handling conveniences do not match the cylindrical can.

Economy. Considering the exacting requirements of tin cans, they are economical to the food processor and his customers. No rival material has yet been able to challenge their combination of strength, resistance to shock and corrosion, convenience of use and low cost.

Merchandising values of the metal container are realized by both the manufacturer selling the canned food to distributors and by the retail management at point of sale. Because of their durability, uniformity of size and the fact that they require no special treatment in the form of refrigeration or other expensive temperature control in storage, they represent an economical, convenient item for the retailer to handle.

The paper label attached to the can or the lithographed can body itself constitutes an advantageous tool for the delivery of the manufacturer's message to the consumer-buyer. The increasing emphasis on self-service buying in merchandising foods makes the customer more and more dependent upon the label for guidance.

Then, too, in its present role as point-of-contact salesman, the canned-foods label must indeed serve as "the window of the can," showing the shopper as accurately and invitingly as possible just what is inside the can, so that she can select the food products best suited to her family needs.

To make the label effective in this vital role, the canned-foods industry exerts every effort to describe each and every factor of quality that is meaningful to the customer and to give this information in standardized descriptive labeling terms which have the same meaning from coast to coast. Consistent use of these standardized descriptive terms enables the housewife to locate the canned foods which her family enjoys, and to avoid those not to their liking. Thus the canning industry serves the varying tastes of individual customers. (See "New Approaches in Labeling," p. 588.)

Handling methods. Cans are received at the cannery by truck or by rail. Usually they are conveyed directly to the cannery from an adjoining can-manufacturing plant. In rare instances the canners themselves manufacture their own containers.

Shipments of cans include open cans and separate packages of can lids. The open cans are handled by mechanical conveyor which usually rolls or carries them direct to the filling line. Occasionally, the cans are stored in canners' storehouses until needed. After the food has been filled automatically or, in a few instances, manually, the conveying line carries the can through a closing machine where the lids are sealed on the top. Some cannery lines can fill and close up to 500 cans a minute, but average speeds are around 200.
(*This article continued on page 312*)



PHOTO COURTESY CONTINENTAL CAN CO.

Canned foods mean better menu variety. Here two cans taped together contain ingredients for Chinese dinner.



PHOTO COURTESY AMERICAN CAN CO.

Canned foods were original "convenience food"—still lead the way. Recent example: canned pie filling.



Fast Facts About genetron®

...the Right Propellant

"Genetron" aerosol propellants have long been the first choice of many leading aerosol fillers and marketers and the number is increasing daily. Now, with General Chemical's expanded line, an even greater variety of products can profit from the growing demand for the conveniences of "push-button living" which aerosols make possible.

"Genetron" propellants are ideally suited for formulating a wide range of aerosols... household, drug, cosmetic, agricultural, industrial and many others. Offering optimum vapor pressures and excellent compatibilities, they can give your product many priceless competitive advantages in terms of performance and sales appeal over products marketed in ordinary containers.

Following are the principal "Genetron" propellants which bring new versatility to aerosol packaging.

GENETRON 12: Dichlorodifluoromethane was the first fluorinated hydrocarbon gas to be widely used as an aerosol propellant. It still ranks as most important. Compatible with many product ingredients, it is often used in formulations where its high vapor pressure is required. An important use for "Genetron" 12 is with paint and lacquer formulations where its characteristics help eliminate "orange peel" and permit smooth, even coverage of paint.

GENETRON 11: Trichloromonofluoromethane came into prominent use as an aerosol propellant with the introduction of low-pressure containers. Many products, when formulated with straight "Genetron" 12, exceeded the ICC maximum pressure of 40 psi for this type of can. It was found that by using a blend of "Genetron" 11 and "Genetron" 12, the vapor pressure came well within the limits set for these "beer can" containers. "Genetron" 11's ability to act as an effective pressure depressant on "Genetron" 12, and its high solubility make it rate as a major aerosol propellant.

GENETRON 12-GENETRON 11 MIXES: Solutions of "Genetrons" 11 and 12 constitute the bulk of propellant requirements for present pressurized products, due to the optimum vapor pressures, excellent compatibility with numerous materials, and economical costs achieved for products packaged with these propellants. The 50:50 mixture has proven to be the most widely accepted blend in use, although additional solutions varying from 25-90% "Genetron" 12 are enjoying acceptance for a variety of products. Variations in the proportions of "Genetrons" 12 and 11 in a given formulation will result in corresponding variations in the particle size of the spray, solubility characteristics, hydrolysis rates and comparative cost.

GENETRON 320: Dichlorotetrafluoroethane was introduced as an aerosol propellant commercially when it was found that mixes of dichlorodifluoromethane and trichloromonofluoromethane, in certain formulations (notably those containing water), produced an undesirable reaction that affected the metal containers. It was found that by substituting "Genetron" 320 for trichloro-



TYPICAL AEROSOL PRODUCTS

Any product that can be brushed, daubed, dusted or sprayed on is a likely prospect for aerosol packaging. At right is a partial listing of the many products now being sold as aerosols which are formulated with "Genetron" Propellants.

Adhesive sprays
Air refreshers
Antibiotics
Anti-histamines
Anti-perspirants
Artificial snow
Artists' fixatives
Athlete's foot preventatives
Bactericides
Bandage sprays
Belt lubricators
Bird repellents
Burn ointments
Charcoal lighters
Chrome preservatives
Cleaning fluids
Colognes
Dairy insecticides
Dehydrator sprays
Deodorants
Design layout inks
Dust absorbers
Dye penetrants
Fabric color sprays
Fabric renewers
Fire extinguishers
Flea killers (pet)
Flower tints
Fluorescent lacquers
Foam preventatives
Foot relief sprays
Fur glazers and dyes
Furniture polishes
Garlic sprays
Glare-proof glass sprays
Golf ball renewers

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monofluoromethane in these formulations the unfavorable reaction was eliminated. Blends of "Genetron" 320 and "Genetron" 12 made possible a number of new aerosol products in the drug and cosmetic field.

GENETRON 101: Monochlorodifluoroethane is finding increased use as a propellant for cosmetic formulations containing substantial proportions of alcohol, such as perfumes. In fact, some manufacturers indicate that "Genetron" 101 not only has unique odor stability, but in some cases actually enhances the fragrance of their perfumes. Important feature of "Genetron" 101 is that it is a single compound (not a mixture), possessing constant boiling point and thus maintaining constant vapor pressure and uniform performance during entire discharge of the aerosol. Other important characteristics of "Genetron" 101 are its high vapor volume and low liquid density. When filling on a fluid ounce basis, this means manufacturers can use a greater volume of product ingredient per ounce of propellant.

The following "Genetrons," because of one or more special characteristics, suggest uses principally as blending agents with the foregoing "Genetron" propellants.

GENETRON 226: Trichlorotrifluoroethane has a high liquid density and low vapor pressure that make it particularly suitable for blending with other "Genetrons" in such formulations as dry powders or foam products.

GENETRON 141: Monochlorodifluoromethane may be used as a blending agent where its high vapor pressure and excellent solvent properties are required.

GENETRON 100: Difluoroethane (1-1) has unique solvent characteristics that make it useful as a blending agent.

SPECIAL PROPELLANTS: Though the propellants listed on these pages represent the great bulk of those used in the Aerosol Industry, there are still others available for use where special properties are required.

For Further Information Send for Our Illustrated Technical Manual and Market Data Book

"ALL ABOUT AEROSOLS"

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Metal lubricants
Metal polishes
Mildew preventatives
Moth proofers
Mold release sprays
Nasal relief sprays
Paints and lacquers
Paint and varnish removers
Penetrant oils
Perfumes
Plant insecticides
Plastic protective coatings
Polishing oils
Poultry inhalants
Residual insecticides
Rust cutters
Rust preventatives
Screen enamels
Shampoos
Shaving creams
Shoe polishes
Silverware coatings
Ski waxes
Soil fumigants
Spot removers
Static eliminators
Stencil inks
Suede restorers
Sunburn lotions
Sun tan oils
Tape removers
Topical anesthetics
Water repellents
Waxes
Weed killers
Window cleaners



New potential is found in merchandising cans in multi-unit carriers to meet demands of one-trip shopping.

Can sizes. The canning industry has materially reduced the number of can sizes in use. An intensive study was made in 1949 by the Bureau of Standards of the U. S. Department of Commerce in cooperation with the canning industry. The result was the Department's "Simplified Practice Recommendations for Sizes of Cans, No. R-155-49." (See the accompanying table on page 309.)

Only 32 can sizes were recommended and of these 19 sizes do most of the work. The remaining sizes are used for specific commodities, pimientos, mushrooms, olives, etc.

Nine of the most popular container sizes are as follows:

The 8 oz., "Buffet," holds one cup and is principally used for fruits, vegetables and specialties.[1]

The 10½ oz., "Picnic," holds 1¼ cups and is used for condensed soups, some fruits, vegetables, meat and fish products, and specialties.

[1] Specialties: Usually a food combination such as macaroni, spaghetti, Spanish-style rice, Mexican-type foods, Chinese foods, tomato aspic, etc.

The 12 oz. (vacuum), contents 1½ cups, is used largely for vacuum-packed corn.

No. 300, 14 to 16 oz. This size is commonly called the "1-lb." can. It holds 1¾ cups and is used for pork and beans, baked beans, meat products, cranberry sauce, clams, blueberries and specialties.

No. 303, 16 to 17 oz., holds two cups. Packs fruits, vegetables, meat products, ready-to-serve soups and specialties.

No 2, 1-lb. 4-oz. or 1 pt. 2 fl. oz., holds 2½ cups. Fruits, vegetables, juices and specialties.

No. 2½, 1-lb. 13-oz., holds 3½ cups. Fruits, some vegetables, (pumpkin, sauerkraut, spinach and other greens, tomatoes).

The 46-oz., 1 qt. 14 fl. oz. or 3-lb. 3-oz., holds 5¾ cups. Fruit and vegetable juices, whole chicken, corn, pork and beans, condensed soup for institutional use.

No. 10, 6½ to 6¾ lb., restaurant and institutional size. Fruits, vegetables.

The principal recent trend in consumer preference for specific can sizes has brought about a larger use-proportion of smaller sizes. The shift of population from rural to urban locations has created a larger percentage of "cliff dwellers" residing in city apartments and the resultant loss of storage space has tended to increase the practice of buying one-, two- or three-serving units. The trend toward smaller can sizes had really begun prior to World War II, but was abruptly halted by the tin conservation program.

For some leading canned-food items the No. 2 can has been almost completely replaced by the smaller No. 303 can as the size consumed in greatest volume.

Can linings

Although cans made from plain tinplate are suitable for many products, a number of products canned at present are either adversely affected by exposure to the metal in the can or adversely affect the container. Consequently, organic protective coatings are used as can linings to provide protection above that provided by the tin coating. Oleo-resinous, phenol-formaldehyde, vinyl and wax types of protective coatings are used. From 10 to 20 different formulations or combinations of can linings may be used to meet the many diverse requirements. Most can linings are applied to the flat sheets of plate before they are made into cans, but spray application of can linings has greatly increased during recent years. Spraying after complete or partial fabrication avoids or minimizes many discontinuities in the film resulting from mechanical operation of can manufacture. Can linings must be non-toxic, free from odors and flavors and must be readily applied and cured. They also must withstand the mechanical operation of can making, must provide the required barrier between canned product and metal, and finally must be economical. Although some accelerated tests are used as screening or control tests, complete testing under commercial conditions is required before final approval of a can lining is warranted. These tests are expensive and time consuming because of the specific requirements of different products. Present trends indicate a continuing expansion in the use of can linings and development of linings with faster curing rates.

Conclusion. To specify, procure and use his cans to best advantage the food packer must keep in mind that the can manufacturer fabricates cans for specific products. The product specifications and requirements vary among the multitude of fruits, vegetables, meat, milk, fish, specialties and combinations that make up the more than 500 items canned annually for the American public. This is an advantage, both to manufacturer and packager, for the simple reason that the can manufacturer has developed the cans for use with the product.



Canned-foods demand has been increasing 100-million cases every five years. One reason: more kinds of foods—baby foods, dietetic foods, meats, juices, etc.

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General line cans

General-line cans, as distinguished from the standardized "packers" or "sanitary" cans used in packaging processed foods, are manufactured in 500 or more different styles and designs. General-line cans are produced both for non-food and food products.

General-line cans, so diverse in style and application, have at least two important characteristics in common: they are designed, from the standpoint of shape and size, to meet the specific protective, handling and merchandising demands[1] of the individual group or class of products packaged in them; and many are also specifically functional in regard to the opening, dispensing and reclosure of the container.

The various styles of cans, aside from product classification, fall into several groups according to style and construction.

[1] See "Cans for Chemicals," MODERN PACKAGING, Feb., 1955, p. 140.

Non-food cans

Some of the more important non-food types in common use are: (1) round multiple-friction cans, (2) round single-friction cans, (3) oblong F-style cans, (4) non-refillable motor oil and anti-freeze cans, (5) beer cans, (6) aerosol cans and (7) oval and oblong handy oil and lighter fluid cans.

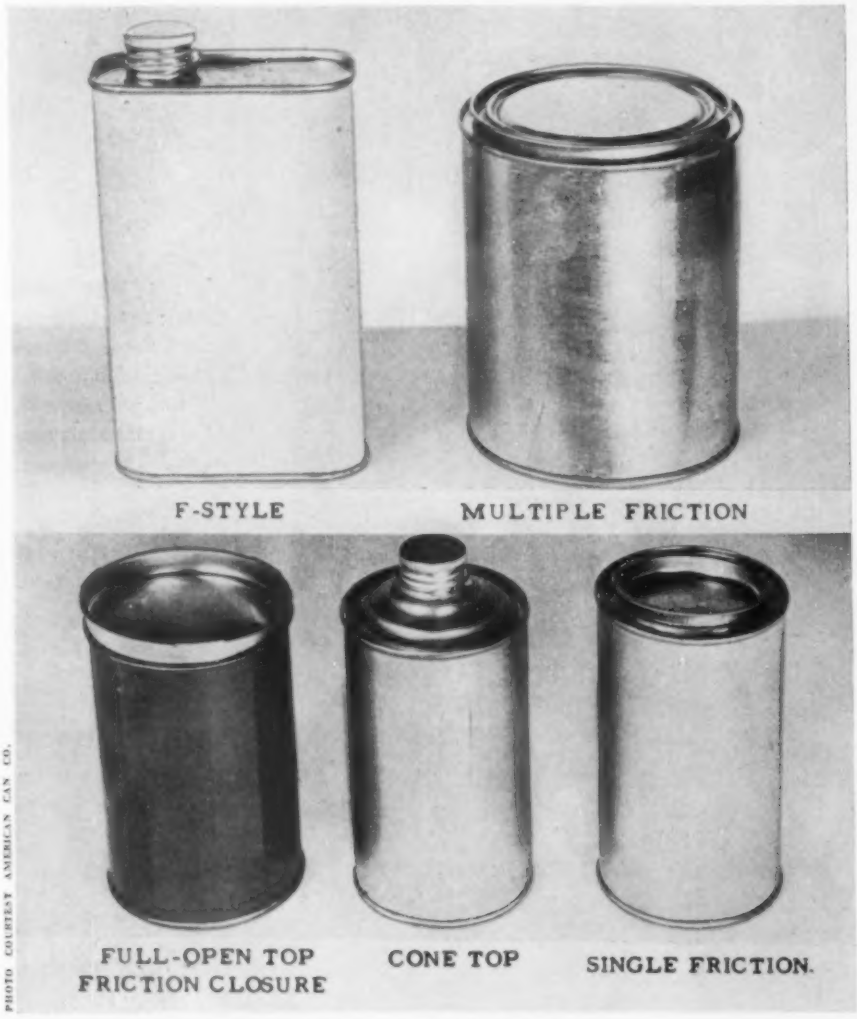
Round multiple-friction cans are principally used for the packaging of paint and related products, together with other liquids where the end use requires a large-opening container. These containers are manufactured in a full size range that has become a standard in the industry. The capacity and approximate size range is from 1 gal. (610 by 708)[2] to ½₂ gal. (209 by 201).

The multiple-friction closure consists of what is known as a ring and a plug and multiple friction is employed so that metal will bind metal at two or more places, thereby furnishing a tight original and reclosure feature to prevent leakage of the liquid products packed therein. A tight closure is essential, for liquid paint and similar products are relatively expensive and require a special degree of protection in shipment, retailing, storage and use.

The 1-gal. size is generally equipped with ears and bails, for a filled container will weigh approximately 8 lbs. and the bail provides a ready medium for the consumer to carry the filled container from the place of purchase. Smaller sizes are not equipped with ears and bails because carrying the lesser weight does not entail a problem. In addition to paint and related products these containers are adaptable to other liquids, powdered products and crystallized products, such as paradichlorobenzene, where an exceptionally tight original and reclosure feature is necessary.

Round single-friction cans employ a closure that is a little more economical than the multiple-friction-type container. Metal engages metal at only one place and a slightly lesser amount of metal is employed in fabrication of the container. While a single-friction can generally furnishes a reasonably tight closure, it is not so tight as the multiple-friction container. This can is used for many non-food products, such as paste wax and powders, and is slightly easier to open because of the single friction.

Oblong F-style cans are manufactured in a complete range of sizes and can be equipped with a wide variety of screw-neck closures. This style can is also known as an I-style can. They are generally employed for liquid products, such as self-polishing floor waxes, varnish, liquid auto polishes, automobile fuel additives, insecticides and other liquids normally



Five common types of general line cans and typical closures.

[2] Can sizes are generally identified in this way. The first digit gives the number of inches and the following digits designate sixteenths of an inch. Thus the 610-by-708-size can is 6 10/16 in. in diameter by 7 8/16 in. high.



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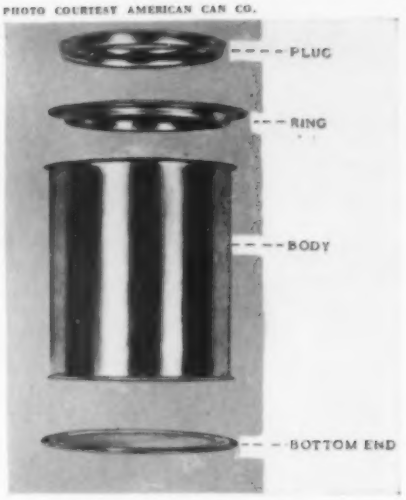
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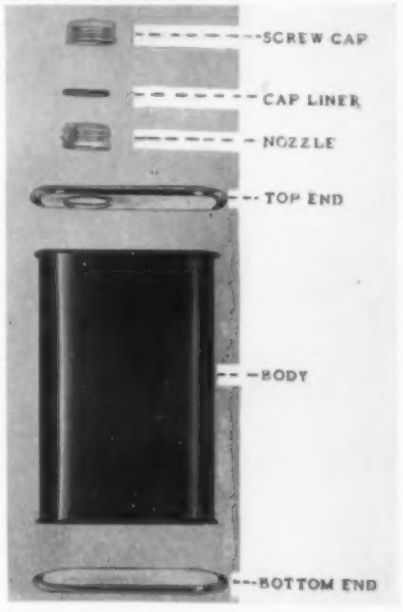
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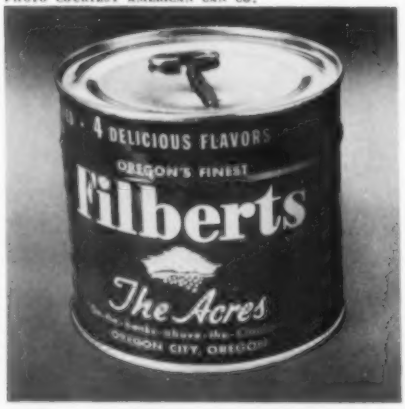
Exploded view of doubletight can. Wide mouth and vaportightness make it useful for pastes, heavy liquids.

PHOTO COURTESY AMERICAN CAN CO



F-style pint metal can is commonly used for varnishes, insecticides, etc., needing reclosure feature.

PHOTO COURTESY AMERICAN CAN CO.



Flavor protection is the specialty of the key-opening vacuum-pack can.

used in the household and industrial fields where the product is to be poured directly from the container. Oblong containers range from 1 gal., 402 by 610 by 908, to 1/16 gal., 108 by 214 by 413[a].

An overwhelming number of these oblong, pouring-neck containers call for the 1-gal. and ½-gal. sizes to be equipped with a 1¼-in. screw neck and cap and tin handle; whereas the smaller sizes are normally furnished with 1-in. screw necks and caps.

Non-refillable motor-oil and anti-freeze cans. Non-refillable cans that are completely tamperproof are normally furnished for the packaging of motor oil in the popular 1-qt. size, 401 by 509, and the 5-qt. size, 610 by 908. These containers are furnished directly to the packer fully lithographed in the desired design and they come into the packer's plant with a bottom seamed on. A 1-gal. oblong can is also being used by some packers for packaging liquid anti-freeze.

Aerosol cans. Aerosol containers have gained prominence in the non-food field and during 1954 approximately 185,000,000 6-oz. and 12-oz. sizes were packaged. The approximate dimensions of the 6-oz. container are 202 by 314 and the 12-oz. container 211 by 413.

Oval and oblong cans for household oil and lighter fluid are furnished primarily in the 4-oz. size. These containers are manufactured with a seamless top that is equipped with a ⅝-in. beaded nozzle and this nozzle is designed to accept both lead and polyethylene spouts that are supplied by a group of manufacturers specializing in these spouts.

General line food cans

Popular types, sizes and shapes of cans in the food group follow:

Key opening, body enclosure (coffee cans). These cans are used mostly for the packaging of coffee under high vacuum or pressure. After the can is opened by removing the rip strip with a key designed for that purpose, reclosure is attained by a short skirt remaining on the top end which fits over a collar retained in the can body. These containers are produced in several sizes, the most common of which are the ½-, 1- and 2-lb. sizes. The majority of these cans are supplied lithographed with the customer's brand-name designs.

[a] The first two sets of digits refer to base dimensions; the third set to height of the can.

Key opening, hinged cover reclosure (shortening cans). There are two popular sizes of shortening cans, namely 1 lb., 401 by 307.5, and 3 lb., 502 by 514. Once the can is opened, the reclosure is attained by a deep cover fitting inside the collar. The rip strip is not completely removed, and the portion which remains as part of the opened container acts as a hinge. These cans are supplied lithographed or plain. With the latter wrap-around labels are used.

Key opening, non-reclosure (pear-shaped ham cans). Pear-shaped hams, purchased boned and ready to eat, are a popular item. They are pasteurized under vacuum after the can is hermetically sealed. A wide range of ham sizes—from 24 oz. to more than 14 lbs. —are packed in cans of this type. This can has no reclosure feature. The key-opening feature allows the container to be opened without marring the surface of the product and permits easy removal from the container. The popular sizes are *miniature base*, 400 by 512 by 211; *midget base*, 503 by 708; *small base*, 606 by 904, and *medium base*, 709 by 1011. The latter three are available in various heights. The miniature base canned ham is a sterile product which can be stored without refrigeration. Refrigeration is necessary for the other three bases. The midget-base height range generally will permit packing 3 to 4 lbs. of product and was developed for use by small families. The heights required for the small and medium bases depend on the size ham which is to be canned and the amount of trimming that will be involved.

Key opening, non-reclosure (luncheon-meat cans). Luncheon-meat cans do not have a reclosure feature and easy removal of the product is accomplished once the rip strip is removed. The larger sizes are pasteurized and storage under refrigeration is required. The 7- and 12-oz. sizes are sterile and may be stored at room temperatures. Luncheon-meat cans are oblong in shape and are available in sizes ranging from 7 oz. to 6 lbs. There is also a Pullman ham base can used for packaging boned ham, as well as luncheon meat. It is a convenient size for meats intended for use in making sandwiches.

Key-opening and non-key-opening meat cans. This classification covers a multitude of sizes. While by no means complete, the list of products packed in cans of this type includes meat



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IN THIS VOLUME...

The Most Comprehensive BUYERS' DIRECTORY

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The Buyers' Directory that begins on page 679 of this edition is the largest and the most useful directory of its type ever published.

How to use the Directory

Listed under the headings in the *Subject Index* you will find practically every container, machine, supply and service which is of interest to packagers. First, consult the *Subject Index;* then, refer to the classified lists of suppliers on the page listed. The address of any supplier can be found in the *Alphabetical List of Manufacturers* at the end of the Directory.

If you need further help

Extensive as the Buyers' Directory is, it may lack certain information which you want. In that case, the Readers' Service Department can be of assistance. Your request for data on products not covered in the Directory, or for additional facts on the items listed, will receive prompt, courteous handling.

Reader's Service Department

MODERN PACKAGING ENCYCLOPEDIA

575 Madison Avenue New York 22, N. Y.

PHOTO COURTESY STERLING SEAL CO., INC.



Drawn cans in many sizes and shapes make long-lived packages. Can be embossed and printed.

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Representative group of non-refillable oil cans. Major packaging features are tamperproof assurance, attractive lithography.

pate, meat baby foods, Vienna sausage, hamburgers, beef and gravy, tamales, tongue, bacon, sausage in oil, chili con carne, poultry products and many others.

Single-friction cans. This type of can, used extensively for non-food items, is also used extensively for many food products. In the food field this type of can is employed primarily for table syrups, baking powder, honey, jams and jellies, and oyster and crabmeat.

There are two different types of cans in this classification: the double-seamed style and snap-end style. The snap-end cans have the bottom end and top ring attached by solder to the can body, whereas the double-seamed style has these units attached by machine application.

Slip-cover cans. Containers of this type have covers which slip over the full opening of either straight-sided or flaring round cans and are generally used for products which need a full opening for proper removal from the package. In this group are 4-, 8-, 25- and 50-lb. lard cans; a 30-lb. can for frozen fruit or eggs, and a 50-lb. frozen-fruit container.

Round open-top pet-food cans. The two most popular sizes in the pet foods are the 211 by 300 and 300 by 407. Generally speaking, the 211 by 300 size is used for packing cat food, and the 300 by 407 size is used for dog food. Cat food is also sometimes packed in the larger size.

Beer and soft-drink cans. This is a highly standardized type. The capacity is 12 oz. and the size is generally 211 by 413 for the flat top and 211 by 407.5 for cap-sealed cans.

However, a 6-oz., cap-seal can of 202 by 314 dimensions is also made and recently a 16-oz. flat-top beer can, 211 by 604, has been produced for a limited number of brewers. A 32-oz. cap-sealed beer and soft-drink can of 312 by 600 is made. It is not used very extensively by the brewing industry today but shows great promise of becoming a standard size in the soft-drink industry in which a 32-oz. bottle has always been a popular size. Beer and soft-drink cans are supplied to the user already lithographed. Thus, the problem of labeling on the packaging line is eliminated. Moreover, the label is permanently affixed.

Miscellaneous types

Other important styles of metal cans, most of them specifically designed for the individual type of product, include containers for tobacco, shoe polish, powders, proprietary items and many others.

Knob-top and flat-top canisters are available for vacuum packing of smoking tobacco and cigars; the smaller-size, hinged-lid pocket-type can continues to be popular as a container for tobacco.

Flat round (base and lid) containers are standard for shoe and leather polishes and are well known for their tight, protective friction closure.

Square-, oval- and round-breasted containers are popular can styles for powders. They come in a wide assortment of sizes and shapes, each with its own different special type of fitting and closure.

Flat tins with hinged lids are standard for aspirin and other analgesic tablets. Hinged-lid containers are also popular for strip bandages and surgical dressings.

There are, in addition, many specialized metal cans for printing inks, hardware and industrial products, and photographic films.

PHOTO COURTESY CROWN CAN

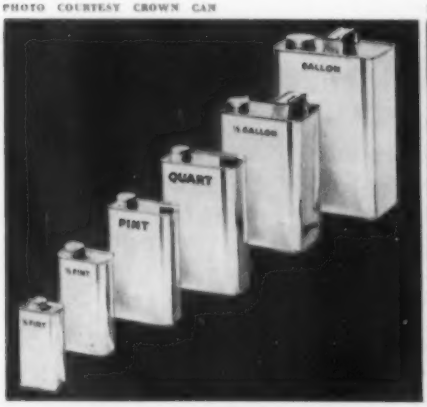


PHOTO COURTESY CONTINENTAL CAN CO.



Family of oblong F-style cans, left, shows size range. A wide variety of screw-on closures is available. Lithographed, square-breasted BiSoDol cans feature protection and ease of opening and closing.

Aerosols: pressurized containers

Basically, an aerosol consists of a gastight, valved container filled with a formulation of propellant and active ingredient. When the valve is operated, the gas pressure in the package pushes the propellant and active ingredient through the tiny opening or orifice in the valve. As it leaves the valve orifice, the propellant expands rapidly blasting the active ingredient into extremely small particles. Thus fine mists, coarse sprays, foams or puffs of dust are produced depending on the product, propellant and valve. In this respect the aerosol package is unique and provides the product manufacturer certain advantages not obtainable with any other container.

The aerosol user thinks of pressure packages in terms of convenience and push-button efficiency. His acceptance of this new type of package has been swift and widespread. As a result non-food aerosol sales are now close to the $200-million-a-year figure at the retail level and approximately 200-million non-food aerosols are being produced annually. It is estimated that an additional 50-million aerosols are being produced annually for foods.

To the aerosol packager, the pressurized container is more than just a package that is rapidly ascending the scale of consumer popularity; it is actually a new horizon, a new dimension in packaging and merchandising.[1]

In the case of insecticides, aerosols have resulted in a greatly expanded market for the products that fight bugs. Because the aerosol fills the air with microscopic particles that float in the air longer and penetrate more space, it is an extremely effective insect killer; and because it is so easy to use it is used more often.

Aerosols make possible the introduction of new products such as Snow and hair lacquer, which simply would not exist if it were not for the aerosol principle of application.

Aerosols put old products in new outlets—paints in drug stores and flower sprays and fire extinguishers in self-service stores. Aerosols change consumer habits, too. The aerosol shave in just three years became the top package product in the shave-preparation field with sales said to be nearing the 50-million mark.

Aerosols have already spread into some 75 different product fields. The major classifications are insecticides, personal products, household products including paints and industrial items. The newer fields for the aerosol, and potentially they may be very large, are cosmetics, medicinals and personal products including tooth paste.

Containers

One reason the aerosol package offers new opportunities is that progress has been made in developing a wide range of containers to help meet a diversity of product and merchandising needs. Available at the present time are beer-type, steel-tin cans, aluminum containers, uncoated glass, plastic-coated glass, glass in a fibreboard sheath and glass inside a metal cartridge.

Plastic aerosol containers have now entered the field with the introduction of a melamine plastic bottle for Angelique Cologne. In addition, experimental work has brought a nylon container to the threshold of commercial aerosol applications. Plastics should contribute importantly to aerosol progress by meeting the need for a break-resistant material that lends itself to attractive design.[2]

The conventional aerosol container is a general line, steel-tin, beer-type can available in 16-, 12-, 6- and 4-oz. sizes. The 12-oz. size has predominated, but in recent years the 6-oz. size has pulled almost even. This is because personal products, employing the smaller-size container have enjoyed such vigorous growth in popularity. Recently 4-oz. cans have been introduced. It is logical to assume more of these containers will appear: (1) because they lend themselves to certain more dainty products and (2) space in the medicine cabinet is at a premium and the larger sizes could soon crowd themselves out of room.

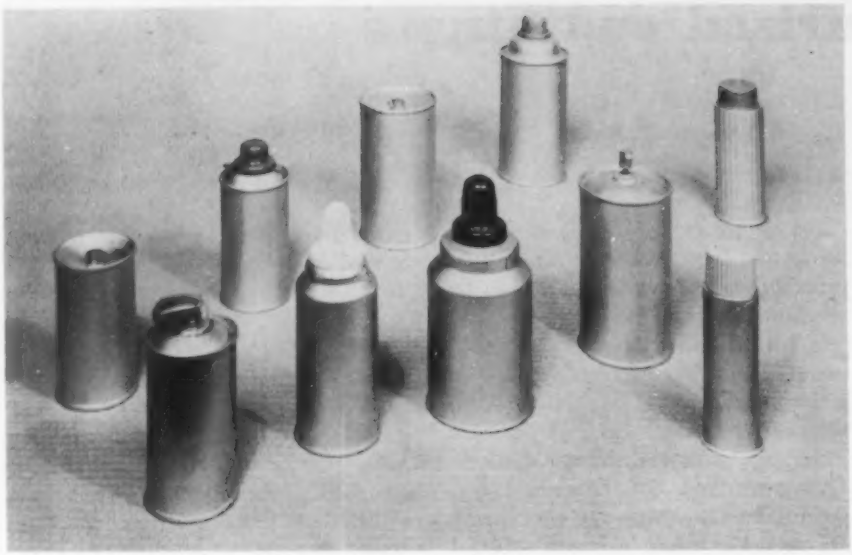
Special types of high-pressure insecticide aerosols are packaged in all-steel containers. The original aerosol insecticides introduced this type of

[1] See "Look at the Aerosol," MODERN PACKAGING, April, 1955, p. 127.

[2] See "The First All-Plastic Aerosol," MODERN PACKAGING, Nov., 1955.



One of the challenging new fields in aerosol packaging involves drugs and pharmaceuticals. Shown is a recently introduced aerosol antiseptic oil.



Representative shapes and sizes—metal containers used in packaging aerosols.

container. Refillable and non-refillable types are produced and marketed in a limited but fairly stable amount.

Aluminum containers, although not important volume-wise, are of interest because they can be made in a range of sizes and attractive designs.

Glass aerosol containers are important because of their inert surface plus the fact that the beauty and moldability of glass lends itself to the traditional packaging requirements of perfumes, colognes and other toiletries. Because the aerosol is a pressurized product, careful attention must be given to the safety of the container.

Certain cologne and perfume formulations have been developed that employ a propellant pressure—under 25 lbs. per sq. in. gauge at 70 deg. F. The formulation is so "engineered" that an excellent spray is produced even though the pressure is so relatively low. Even in this type of aerosol, the strength of the container must be carefully considered. Oval or hour-glass-shaped designs are specified to assure structural strength. At least one supplier recommends silicone treatment of the glass as an added means of protecting the original strength of the glass. A number of leading brands of cologne and perfume use the all-glass aerosol.

For greater safety and for reasons specific to his individual needs, the packager can employ aerosols coated with a thin protective film of vinyl chloride. The outer "skin" may be transparent or colored. Many cosmetics use the attractive plastic-coated glass container.

Other combination packages employing glass include a 16-oz. Boston round bottle encased in a fibreboard canister and a vial encased in a metal cartridge. The former is used for a moth preventive and for a window cleaner. The latter is used for a ¼-oz. of perfume.

Aerosol types. The conventional aerosol is a two-phase formulation, wherein the active ingredient either mixes with or is in solution with the propellant. (See diagram p. 322.) A second type of aerosol known as the three-phase aerosol is designed for water-base ingredients. In this case the product "floats" on the propellant.

Because the aerosol is a relatively complex and expensive package, much planning and know-how are required in the development and production of a successful pressurized product. A great deal of the actual loading and filling is done by custom loaders, but the number of packager installations is also growing. (See "Aerosol Valves," p. 322, "Propellants," p. 324, "Aerosol Filling Methods," p. 480 and "Custom Services," p. 35.)

Food aerosols

In general the basic principles of pressurized containers as described in the preceding paragraphs also apply in the packaging of food items. However, there are essential differences in regard to the type of propellant. In addition, the field has been more limited, having been confined to whipped cream and a few similar toppings.

Propellants. Dissolved gases—nitrous oxide, carbon dioxide or a mixture of these—are suitable for food products because they possess the required freedom from objectionable odors and taste and because they have desired solubility characteristics.

New developments. Development work to bring out additional food products in aerosols is known to have been in progress for some time. Actually, any number of liquid, viscous or powdered foods are candidates, provided successful formulation and dispensing are arranged. Unquestionably the problems of formulation and of packaging a unit priced competitively are formidable.



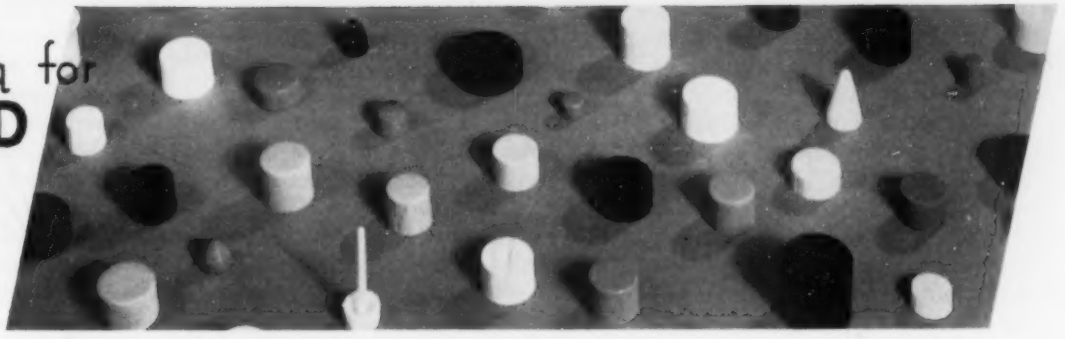
Some of the newer types of aerosol containers are shown here: a seamless aluminum can, a glass vial with a shrink-on plastic sleeve, a 4-oz-size metal can for Dry Mist personal deodorant and glass and plastic-coated glass containers for fragrances.

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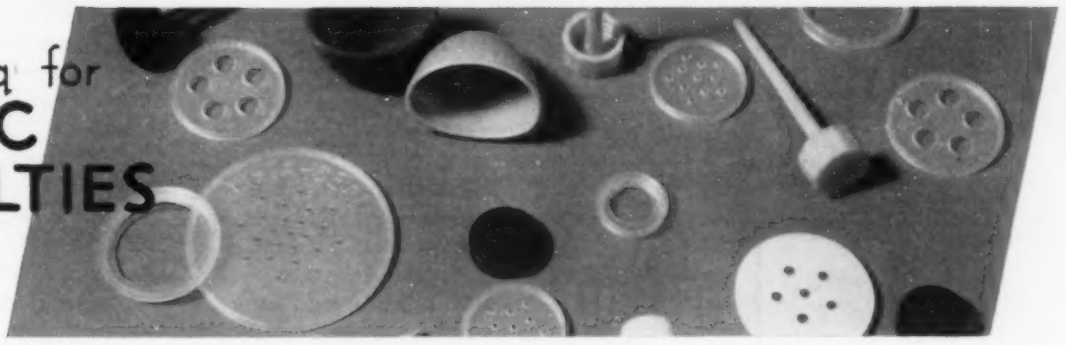
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Valves for Aerosols

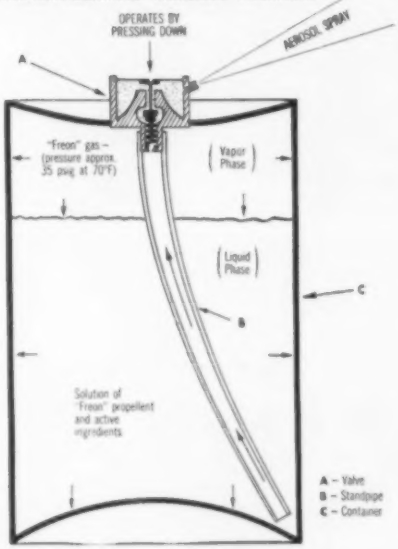
by Frederick G. Lodes

Valve performance is a critical factor in the packaging and merchandising of pressurized containers. Selection of the valve is influenced by the product, the propellant and its specified pressure, the type of spray desired and the method of filling, as well as economy.

Valves typically consist of a push button, mounting cup, washer, valve stem, spring, valve body and dip tube. However, additional components —especially a protective dome or cap —may be involved. The number of components varies according to the type and make of valve employed. The valve assembly mounted in the metal cup is supplied as a complete unit to the aerosol packager, although the push button may or may not be assembled. The metal mounting cups, which correspond to the lid of a can, are generally produced in a standard or "universal" size for an opening of 1-in. diameter. Valves for glass aerosol containers are mounted in an aluminum metal ferrule that crimps over the neck of the bottle. A range of diameters is available, but the popular size is made for bottles that have a 20-mm neck finish. The first plastic aerosol, introduced just as this issue went to press, has a melamine valve assembly that screws onto a threaded collar of the melamine closure.

[a] Precision Valve Corp., Yonkers, N. Y.

CROSS-SECTION OF TYPICAL SPACE OR SURFACE-COATING AEROSOL PACKAGE.



Aerosol principle depicted here can also be modified for foam, ultra-low pressure and powder.

Although the demands in regard to valve performance are exacting, the cost of valves has not gone up but has been reduced. This stems directly from improved equipment, methods and know-how which have greatly increased the efficiency of valve-manufacturing processes. There has been improvement in the styling of the valve and a wider choice of colors for plastic parts has been made practical. It is important to note, however, that the valve assembly is a working component of the aerosol. Attempts to create stylish designs that ignored this fact have complicated valve performance and have resulted in retailer and customer dissatisfaction.

Obviously, in view of the "tailored" requirements involved, there is no universal valve—no one valve that can be employed indiscriminately in dispensing aerosols or allied products without modification in construction, materials and design. Instead, valve manufacturing has tended to specialization, with the result that advancement has not only kept pace with improvements in products, propellants and containers, but has successfully met many new packaging demands.

For example, in 1948 and 1949, the introduction of new low-pressure aerosols such as paints, lacquers, plastic sprays and waxes called for radical changes in valve design, construction materials and spray characteristics to overcome several complications: valve clogging; excessive swelling of the valve gasket resulting in leakage, and faulty spray caused by improper formulations and inadequate nozzles.

Succeeding products presented additional problems. Prime examples were hair lacquers and personal deodorants, which were corrosive.

For example, it was found that certain aluminum alloys were affected by the presence of alcohol, water and certain propellants. Cadmium plate also was affected and, in the case of deodorants, some aluminum salts attacked aluminum alloy materials.

As a matter of fact, the presence of moisture in most other products contributed to the corrosion of aluminum alloys. This moisture was being introduced into the aerosol units as an impurity in the raw materials used and from room humidity.

The problem was minimized by fillers, who eliminated the source of the introduction of moisture into the container, and by the valve manufacturers, who modified the valve designs sufficiently to overcome corrosion troubles.

A recent development in the aerosol field, which further illustrates the point that there is no universal valve, is the reappearance of the pressure-filling method. Products like paint, shave cream and others present a loading problem when the refrigeration process is used. Accordingly, pressure filling had to be adopted. This called for changes in valve design to accommodate the filling operation and assure efficient packaging.

Pressure-filling equipment has been developed that permits the loading of the propellant gas under the mounting cup rather than through the valve. This method is said to simplify the loading operation, for the valve is not involved in the pressure loading. The new method also eliminates the additional step of inserting the push button after filling.

The more recent type of products necessitating valve modifications are those requiring low delivery rates. Certain types of hair dressings and various insecticides have been formulated on the basis of depositing less of the active ingredients per discharge in a given time. The existing aerosol spray valves were not suitable for this type of application, hence valve modifications were necessary to obtain the desired delivery rate. This has been accomplished by a redesigning of valve openings.

The newest product requiring valve modifications for satisfactory performance is the dry powder spray. The most important factor in this instance is valve clogging. However, with this type product some formulation changes must accompany valve changes for satisfactory performance.

Another recent development is the introduction of valves that control or meter the quantity of product dispensed.[1] Logical applications for this type of valve are said to include expensive perfumes, pharmaceuticals and similar products where the avoidance of waste or precise measurement are critical factors. Of course, the conventional valve also excels when it comes to spray control and accurate dispensing. The special advantage of the meter valve is the fact that shut-off is automatic. Thus an adult with an "uneducated" thumb or a child will

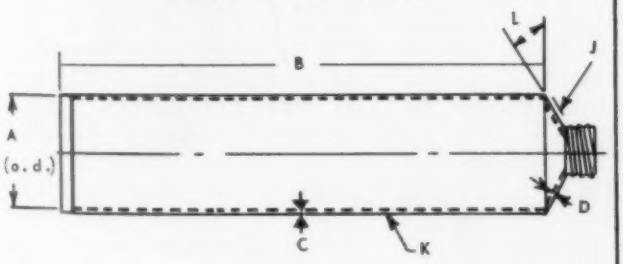
[1] See "Now Comes the Metered Mist," Modern Packaging, Mar., 1955, p. 80.

TUBE DATA FOR PACKAGE DESIGNERS

Standard Sizes and Capacities of WIRZ Tubes

Tube Size (Diameter)	Max. Length	Approximate Capacity (fluid ounces)	Allowable Range of Orifices and Necks			
			12	16	20	28
3/8"	2"	1/8—1/4 oz.	X			
1/2"	4"	3/16—3/8 oz.	X			
5/8"	4"	1/4—1/2 oz.	X	X		
3/4"	4 1/2"	5/8—7/8 oz.	X	X		
7/8"	5 1/4"	1—1 3/8 oz.	X	X		
1"	6"	1 3/8—2 1/4 oz.	X	X	X	
1 1/8"	6 1/2"	2—2 3/4 oz.	X	X	X	X
1 1/4"	7"	2 1/2—3 1/4 oz.	X	X	X	X
1 3/8"	7 1/8"	3—4 oz.	X	X	X	X
1 1/2"	7 1/4"	3 1/2—5 1/2 oz.	X	X	X	X
1 3/4"	8"	6—8 oz.			X	X
2"	10"	8—15 1/2 oz.			X	X

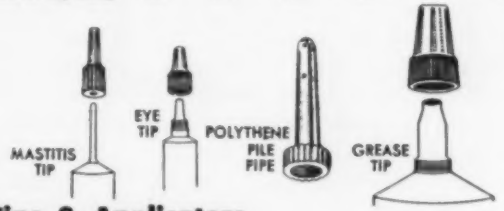
Standard Nomenclature



A . . . . . Outside Diameter
B . . . . . Body Length
C . . . . . Wall Thickness
D . . . . . Shoulder Thickness
J . . . . . Shoulder Embossing
K . . . . . Base Coat and Printing
L . . . . . Shoulder Angle

Standard Openings —

Size of Neck	No. 8	No. 10	No. 12	No. 16	No. 20	No. 28
Size of Opening	1/8"	5/32"	3/16"	1/4"	5/16"	7/16"



Tips & Applicators

Eye Tip	Maximum Opening	3/64"
Nasal Tip	" "	3/32"
Acorn Tip	" "	1/16"
Caulking Tip	" "	5/16"
Grease Tip	" "	.210"
Mastitis Tip	" "	.050"

Screw Eye Tip for reclosing cement tubes
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For full tube information write for our 8-page folder, "Wirz Collapsible Metal Tubes"— no obligation, of course.

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Wirz specializes in special packages for unusual products such as paint, food, lighter fluid, battery cases, and many, many others. Write us for data on your particular product.

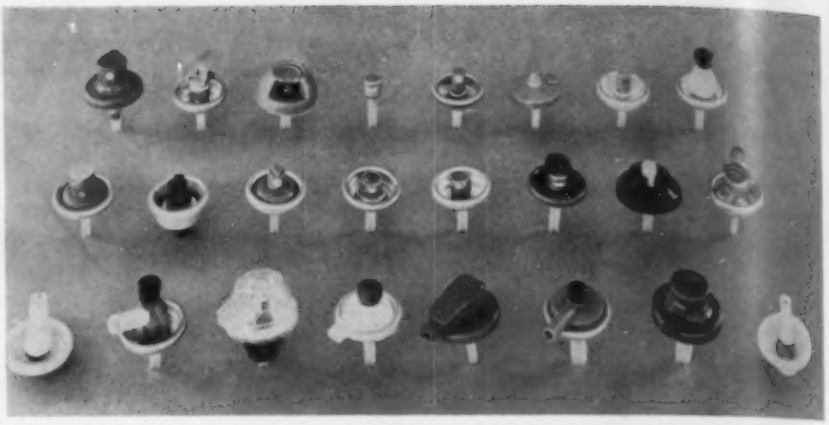
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PHOTO COURTESY RISDON MFG. CO.

Valve on this container is specially designed for powder aerosol.



Many different types of aerosol valves are available to meet the exacting, precise requirements of mist sprays, surface sprays, foams and powders.

not waste the product or apply an overdose.

Clogging. The problem of valve clogging—with such products as paints, lacquers, plastic sprays and waxes—is overcome by proper design of the valve expansion chamber and also by an inner and outer orifice of a suitable size.

At times changes in valve design are to no avail for the proper and intended function. Faults in the formulated concentrate or over-all formulation must then be attacked by the valve manufacturers together with the formulators, working in close cooperation with each other. At the point where the package cannot be adapted to the product, the product must be adapted to the package.

Inoperation of the container valve caused by excessive gasket swelling may be remedied by the selection of a gasket material that can withstand the swelling action of the solvents present. This is often difficult and changes of the solvents are needed.

Corrosion. This problem is best remedied by a change in materials of valve construction. Certain types of nylon can be substituted effectively for metal parts, with no change in design and valve operation involved. Although nylon will change dimensionally in some solvents, this change is not detrimental to satisfactory valve operation. Nylons are unaffected to a large degree by most of the chemicals used in aerosol formulations at the present time. There is a 0.007-in. swelling of the material in the most serious and common offender, alcohol.

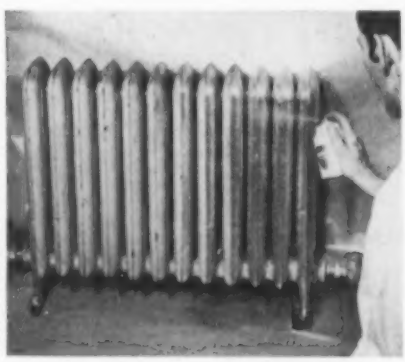


PHOTO COURTESY GENERAL CHEMICAL

Aerosol paints are a natural for the hard-to-reach places.

Aerosol Propellants

The propellant in an aerosol product is the agent which provides the internal pressure that expels the active ingredient from its container when the valve is depressed. In addition, in products like insecticides, the propellant provides the "blasting" effect which breaks up the active ingredient into fine spray particles.

Under the definition proposed by the aerosol division of the Chemical Specialties Mfrs. Assn. "aerosol" products are construed to mean those which use a liquefied gas as the pressure-producing agent. Compressed gases, such as air, nitrous oxide and carbon dioxide, also can be used as propellants and, in fact, a mixture of nitrous oxide and carbon dioxide is commonly used in pressure-packed whipped cream. Choice of the last two as the propellant mixture in such a food product is based largely upon their relatively negligible toxicity when inhaled or ingested.

Among liquefied gases, by far the most commonly used propellants are the fluorinated hydrocarbons. The fluorinated-hydrocarbon compounds have proved through continuing studies to be safe from an inhalation standpoint in the amounts encountered in conventional use of aerosol products. The studies have been made during the more than 25 years the compounds have been used as refrigerants in all types of cooling equipment. Ingestion studies on these compounds, of prime importance for food products, have been initiated only recently and several years of work will be required before their safety in food products can be established conclusively.

Among the fluorinated hydrocarbons, trichloromonofluoromethane, dichlorodifluoromethane and dichlorotetrafluoroethane constitute the bulk of the propellants now in use. (See table, "Properties of Aerosol Propellants," p. 327.) Other types used in very small amounts include trichlorotrifluoroethane and monochlorodifluoroethane.

Liquefied-gas propellants other than the fluorinated hydrocarbons currently in use in aerosol products include methylene chloride, methyl chloride and butane. Methylene chloride is used to some extent, because of its solvent power, in combination with certain fluorinated hydrocarbons. Methyl chloride is limited to small numbers of high-pressure aerosol products, like insecticides and fungicides, for professional rather than amateur consumer use, so that adequate safeguards can be maintained against its higher toxicity. Butane is sometimes used to a very small extent with other propellants.

Big advantage of liquefied-gas propellants over compressed-gas propellants is that they provide a uniform, steady dispensing pressure throughout the life of the aerosol. A compressed-

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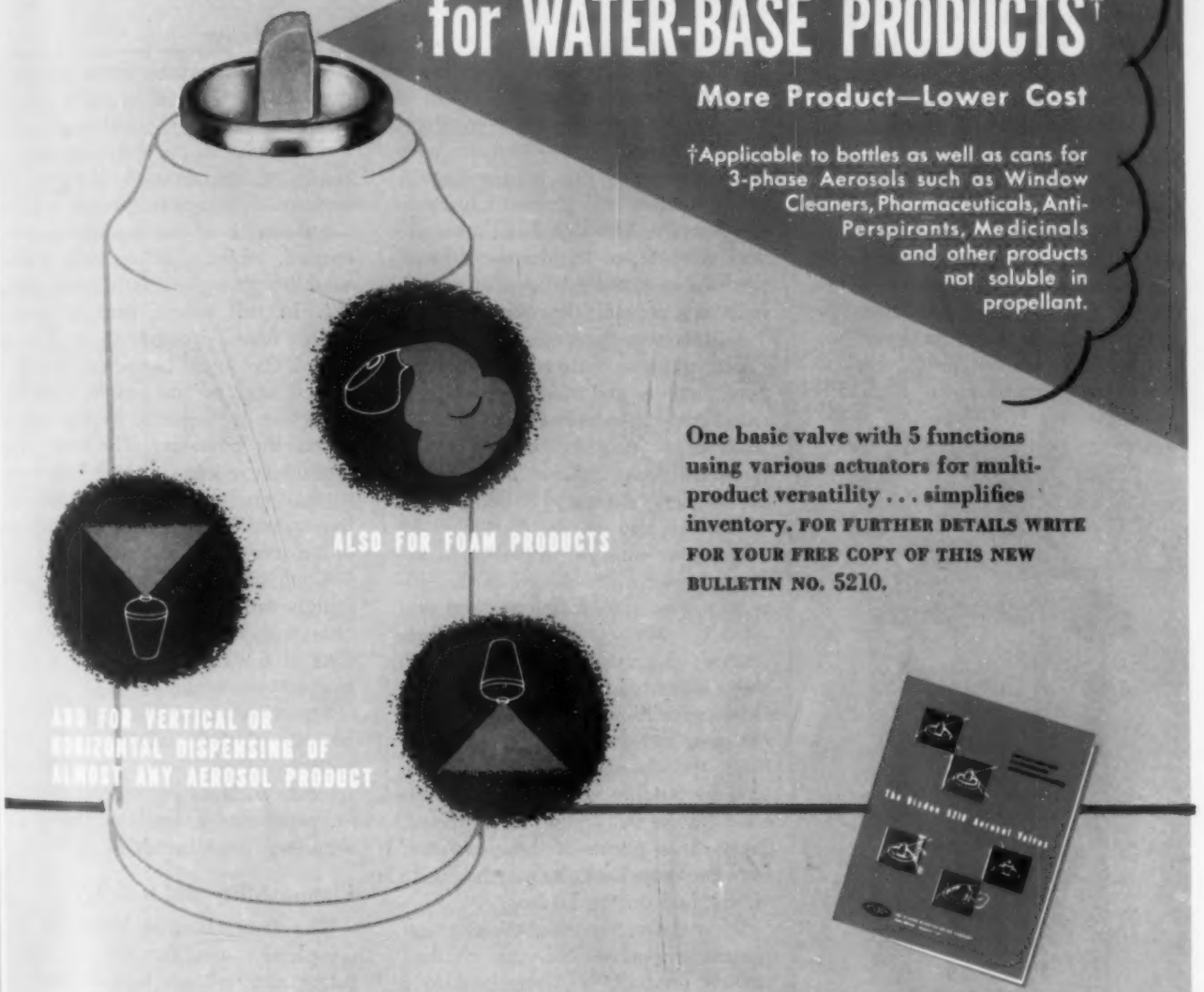
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gas propellant has a high initial pressure, but the dispensing pressure decreases with use of the aerosol container. And, within the safety limits of the economical, commonly accepted aerosol container, not enough compressed gas can be included to assure complete evacuation of a reasonable amount of active ingredient. In some products, like insecticides, the product quality can change with variations in pressure.

Choice of propellant

The choice of propellant is based upon such factors as:

1. Pressure desired, which is allied closely with the spray pattern desired.
2. General compatibility of the propellant with the rest of the formulation and with the container parts.
3. Effect of the propellant upon the toxicity or flammability of the spray.
4. Stability of the finished aerosol product.

Pressure

So far as pressure is concerned, aerosol products must conform with regulations of such agencies as the Interstate Commerce Commission, the U. S. Post Office Department and various other regulatory bodies, such as local fire departments. Generally speaking, dispensing pressures must be below 40 lbs. per square inch gauge[1] at 70 deg. F. for the common low-pressure metal aerosol container. Products with a dispensing pressure from 40 to 60 psig at 70 deg. F. must be packed in a specially designed metal container, while pressures above 60 psig require a high-pressure steel container. Again generally speaking, products with a dispensing pressure below 25 psig at 70 deg. F. are not subject to regulations of the ICC. Such products have appeared in glass aerosol containers and are now in plastic containers.

Any desired pressure can be obtained with the fluorinated-hydrocarbon propellants commonly used today, because each compound has its own unique vapor-pressure characteristics. Dichlorodifluoromethane, for example, provides a pressure of about 70 psig at 70 deg. F., while trichloromonofluoromethane has comparatively little pressure at that temperature. A 50-50 mixture will give an intermediate pressure. Although it has some solvent advantages, trichloromonofluoromethane essentially is used in propellants as a pressure depressant.

Dichlorotetrafluoroethane has a vapor pressure between dichlorodifluoromethane and trichloromonofluoromethane. It generally is used alone in personal products like perfume or with dichlorodifluoromethane in products like shaving cream and hand lotion.

Pressure also can be controlled by varying the ratio of propellant to active ingredient, by means of the solvent and by the loading method employed. Many solvents produce changes in pressure that are close to those estimated from simple gas laws. Other solvents such as alcohol, which are quite different in chemical nature from the fluorinated hydrocarbons, tend to produce solutions with pressures higher than might be expected. Pressures in excess of those expected from the propellant also may be due to air trapped during loading.

Spray character, one of the most important properties of the finished aerosol product, is determined to a large extent by the propellant and the pressure it generates within the container. The nature of the spray can be controlled by varying the concentration of the propellant and the pressure of the formulation. Valve design also helps determine spray character.

Generally speaking, a high propellant concentration produces a misty spray while a low propellant concentration produces a much wetter, streamlike spray. In foam-type products, high propellant concentrations produce stiff, dry, elastic foams, while lower propellant concentrations give soft, somewhat wet and less resilient foams.

Spray characteristics can also be affected by the type of propellant. In foam products, for example, even though the propellants are present in the same concentration, those with higher pressures tend to give stiffer, more elastic foam than those with lower pressures.

Compatibility

The term compatibility includes questions of original solubility as well as changes in the physical condition of the formulation upon storage or as a result of temperature changes. In some cases, complete solution of all of the materials of the formula may be needed, while in others only partial solubility may give a satisfactory product. In still others, such as water-based foam products like shaving cream, the active ingredient and propellant may be immiscible, each existing as a separate liquid phase within the container. The latter type of product requires shaking before use so that immiscible propellant and active ingredient will form an emulsion or a dispersion of one in the other.

Compatibility may change quite rapidly with temperature so the choice of a propellant must be based upon tests of the formulation over a wide temperature range.

Sometimes the active ingredient will be only partially soluble in the propellant. In such cases, an auxiliary solvent, such as methylene chloride for paints and enamels or alcohol for perfumes, must be added.

Flammability and toxicity

The fluorinated hydrocarbons are completely nonflammable in themselves and will not support combustion. However, because of the varying nature of active ingredients and solvents, they do not guarantee nonflammability of the finished aerosol formulation. Butane, of course, is flammable. Thus, the propellant chosen has a marked effect on flammability of the finished formulation.

Flammability of an aerosol prod-



PHOTO COURTESY U. S. PACKAGING CORP.

New king-size aerosol uses 16-oz. can, delivering 95% more snow.

[1] "Gauge pressure"—ordinary reading as recorded by pressure gauge and distinct from absolute pressure.

uct is checked by such means as the flame projection test, modified Tagliabue open-cup test, and open- and closed-drum tests. Full information on these tests can be obtained from the Chemical Specialties Manufacturers Assn., the ICC or the Bureau of Explosives.

Toxicity of finished aerosol formulations is an important consideration and it is essential that all products comply with regulations of such agencies as the Food and Drug Administration and the U. S. Department of Agriculture.

The fluorinated propellants have a very low degree of toxicity and this is a major reason for their wide use. In the accompanying table, the relative safety of the various compounds, so far as inhalation is concerned, is indicated by the Underwriters' Laboratories' system of comparison.

Product stability

A satisfactory aerosol product is one in which the active ingredient undergoes no change during normal shelf storage and use period.

Sound storage tests, in advance of formal marketing, can detect potential problems, such as corrosion, valve malfunction and gasket leakage, before the product is distributed.

Because the commonly used aerosol propellants boil at temperatures below room temperature, they must be handled and stored in pressure containers or in refrigerated equipment which will keep them in a liquid state by cooling them below their boiling points.

Shipping containers are subject to regulations of the ICC and plant storage containers usually are specified by, or subject to, local or state regulations. General rules for handling any material under pressure apply.

Propellants are available in container sizes ranging from 10-lb. to ton cylinders, in tank trucks and in railroad tank cars. Information regarding containers, storage and handling is available from propellant producers.

PROPERTIES OF AEROSOL PROPELLANTS*

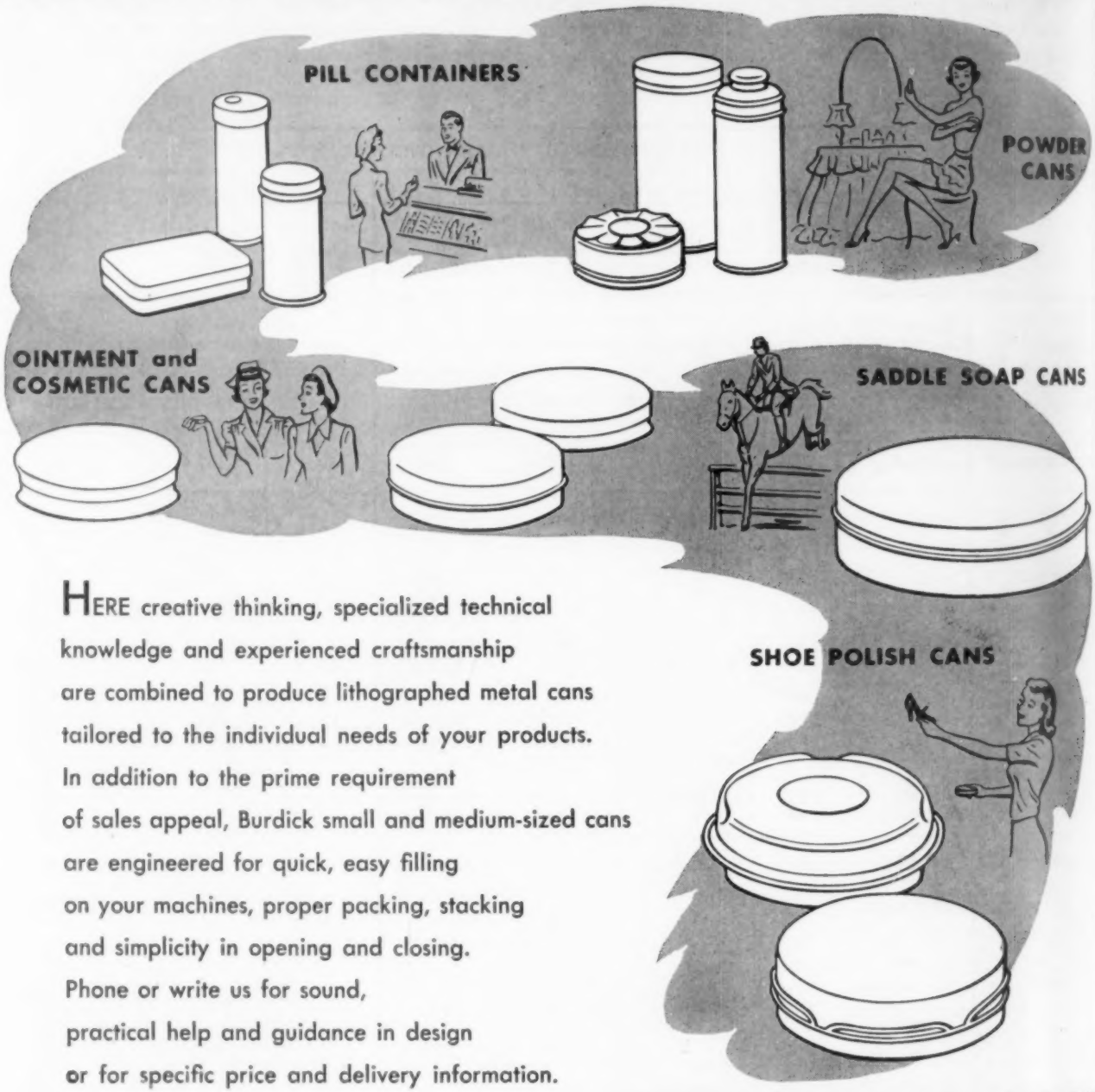
	Most commonly used propellants					*Other propellants*		
	Trichloromonofluoromethane	*Dichlorodifluoromethane*	*Dichlorotetrafluoroethane*		*Methylene chloride*	Methyl chloride	*Trichlorotrifluoroethane*	*Monochlorodifluoroethane*
Trademark	Freon-11[1] Genetron-11[2]	Freon-12 Genetron-12	Freon-114	Genetron-320			Freon-113 Genetron-226	Genetron-101
Chemical formula	CCl_3F	CCl_2F_2	$CClF_2–CClF_2$	CCl_2FCF_3	CH_2Cl_2	CH_3Cl	$CCl_2F–CClF_2$	CH_3CClF_2
Molecular weight	137.4	120.9	170.9	170.93	84.9	50.5	187.4	100.5
Boiling point at 1 atm., °F	74.8	−21.6	38.4	37.4	103.6	−23.7	117.6	15.4
Freezing point, °F	−168	−252	−137	76	−142.1	−97.6	−31	−203
Vapor pressure, psia. 70°F	13.4	84.8	27.6	28.07	7.2	73.4	5.5	43.5
130°F	39.0	194.9	73.5	75.2	24.2	176.9	18.5	111.8
Liquid density, lbs./cu.ft. 70°F	92.7	82.6	91.6	92.2	82.4	57.3	98.3	69.8
130°F	87.6	74.5	84.9	85.5	79.0	53.0	93.2	64.1
Liquid density, gms./cc. 70°F	1.48	1.32	1.47	1.48	1.32	0.92	1.57	1.12
130°F	1.40	1.19	1.36	1.37	1.27	0.85	1.49	1.03
Flammability	Nonflam.	Nonflam.	Nonflam.	Nonflam.	Nonflam.	Flammable	Nonflam.	Flammable[4]
Toxicity[3]	5	6	6	6	4 to 5	4	4 to 5	Probably in UL grouping 5A
Effect on elastomers % increase in vol.								
Neoprene type	60	0	0	0	150	80	7	Unknown
Buna N type	15	5	0	0	250	150	2	Unknown
Natural rubber	90	15	5	5	140	100	60	Unknown
Examples of uses	Insecticides, room deodorants, hair lacquers	Insecticides, deodorants, paints, shave creams	Shaving creams, colognes anti-perspirants, powders		Insecticides, paints	Professional-use sprays—greenhouses, farms, etc.	Special products	Personal products—antiperspirants, colognes, perfumes

* Sources: the information in this table is derived from more comprehensive tables prepared by supplier companies.
[1] "Freon" is the trademark for fluorinated hydrocarbons produced by E. I. du Pont de Nemours & Co. (Inc.).
[2] "Genetron" is the trademark for fluorinated hydrocarbons produced by General Chemical Div. of Allied Chemical & Dye Corp.
[3] Underwriters' Laboratory grouping: group 6 no evident toxic effect; groups 5 and lower have progressively greater toxicity.
[4] Flammability range is reported at 9 to 14.8% of the volume in air.

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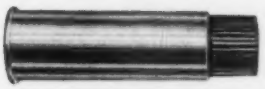
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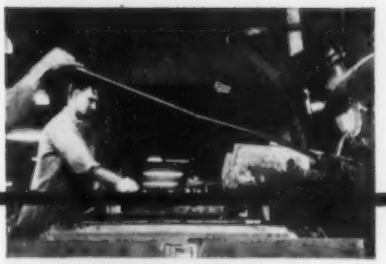
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Collapsible tubes

The collapsible tube is pre-eminently a user's package. It provides almost automatic dispensing of semi-fluid products in handy quantities. It is practically free from all risk of breakage or package failure. It permits sanitary use by more than one person of products like toothpaste or ointments. It is easy to handle and easy to dispose of when empty.

In special forms and with special applicators, tubes provide for safe, convenient application of medicaments to the eye, nasal passages and other body cavities. Similar utility is found in tubes for veterinary applications. Many special applicators have valuable industrial uses for applying adhesives, lubricants, inks, etc.

From the standpoint of the packager, tubes offer many specific convenience factors. They are light in weight and are safe and easy to handle during packaging and distribution. Machinery available for packaging tubes (see p. 418) ranges from hand-operated models for small runs to fully automatic equipment that fills and closes 150 tubes a minute.

Tubes are usually lithographed, thus eliminating the problem of additional labeling and at the same time providing excellent opportunities for decoration. Tubes lend themselves to cartoning and bundling, or they can be packaged in packers, dispensing units or be mounted on display cards. Prescription items not intended for display are convenient for the druggist; also they discourage substitution.

The manufacturer's first consideration in using tubes for packaging is the compatibility of his product with the tube metal and the linings of both tube and cap. It is highly important that he conduct thorough tests to make certain that proper materials are specified to avoid possible contamination of his product and to assure proper product protection. Materials for applicators must be chosen carefully, too. For example, if sterilization of the applicator will be required, a material that is not sufficiently heat resistant would be a bad choice.

Materials

Metals used in manufacturing tubes are aluminum, tin and lead. The tin and lead may be alloyed or coated.

Pure tin tubes are made of new virgin tin alloyed with a small amount of copper or other suitable stiffener in minute quantities. Tin is generally recommended for medicaments that are to be taken internally. Tin tubes are used for medicinal ointments even when restrictions are in effect.

Aluminum tubes are lighter in weight and slightly less ductile than tin. Their use involves some research in adaptation to certain products, particularly those containing alkalies, but, in general, they cover the same field as tin collapsible tubes. Satisfactory inhibitors for adjusting a noncompatible product and internal linings for the tube have been developed for certain products.

Lead tubes are made of pure lead with a small amount of antimony. They are employed chiefly for adhesives, shoe creams, rubber cements. Although not for products to be taken internally, lead tubes are satisfactory with or without linings for cosmetics like shaving preparations.

Tin-coated tubes, having a lead alloy base with an evenly distributed thin coating of tin inside or outside, are made in such a way that the two metals cannot be separated.

Tin-lead alloy tubes are a basic alloy of tin, lead and antimony with a tin-coating operation separate.

Manufacture

Metal for tubes is usually melted from pigs, molded into slabs and cut into slugs of predetermined size. The slugs are fed into presses and are extruded under enormous pressure into tubes, including body, shoulders, shoulder embossing and neck, which must be threaded and trimmed. The tube at this point may or may not have an aperture in the neck.

Tubes to be printed are then coated in one color and, while this undercoating is still tacky, the wording and design printing are applied. Several colors can be applied—a separate plate being required for each color. The base coat is usually a lighter shade than the imprint. Lacquer may be added to protect decoration from products that would attack the inks and cause colors to run or fade. Lacquer also enhances the luster of the lithography.

If an interior protective coating is necessary, it is applied before the final operation of inspecting and packing. Tubes normally are packed in nested chipboard containers holding part or multiples of a gross lot. Mechanically filled tubes should be packed in quantities that match the handling capacity of the filling machines; that is, if the machine handles eight tubes at a time, tubes must be packed in the container in multiples of eight.

In order to prevent tubes from sticking in the container, care must be taken to see that they are not packed

PHOTO COURTESY A. H. WIRZ, INC.



New strippable labels, applied by pharmaceutical manufacturers, are easily removed and replaced by druggists.

PHOTO COURTESY SHEFFIELD TUBE CORP.



Convenience of one-shot tube offers growing potential for products and samples in units-of-use quantities.



Metal tube for glue has a ball-valve dispensing cap. Slight pressure rolls on a dot or fine line of glue.

before coatings are dry. The height of the partitions of the containers must equal the over-all tube length to give protection against damage to open ends of the tubes.

Specifications

The size of the tube should be determined individually and carefully by the packager in accordance with the standards of the tube industry, the density of his product, merchandising considerations and the like. The ratio of diameter to length should be about one to five; and according to tube standards, the diameters vary by ⅛-in. differences.

The size of the neck opening is determined by a product's consistency and use. Heavier and thicker products need larger openings than thin or volatile materials.

Two shapes of tubes are available –the fat fill or the V fill. The most common selection is an in-between shape that combines the well-filled look of the fat fill and the appearance of greater length of the V fill.

Specifications for tubes, which may be given in the form of blueprints, usually cover the following points:

Dimensions: Diameter at the shoulder; length from shoulder to open end. Size of neck and diameter of neck opening. Capacity in grams or ounces. Length of neck or tip, if special.

Cap: Material and liner.

Decoration: Shoulder embossing, if any; coating; number of colors in printed matter.

Material: Tin, tin-coated lead, tin-lead alloy, lead, aluminum, etc.

Lining: If required, thermoplastic wax coating, such as AMR-10, or a lacquer coating.

Packaging: Number of tubes per container—one-half gross, one gross, etc.

Reasonable manufacturing tolerance should be allowed for length, weight and particularly diameter in relation to the size of the cup in the filling machine.

Internal coatings and closures

Choice of lining material is a factor of great concern, because tubes have such a range of uses that they must withstand attack by products all the way from a good sour vinegar right through to harsh products such as



CLOSURE, SHAW INSULATOR CO.

Yardley Shampoo tube has non-losable polyethylene cap hitched to a cord. Cord hangs tube on shower handle.

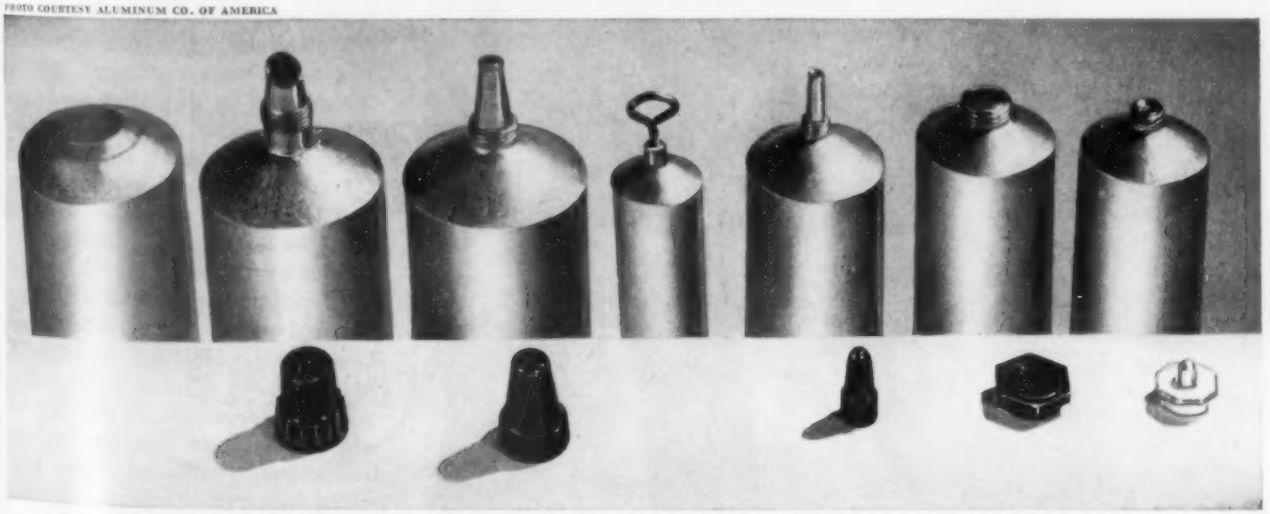
washing powder—or, in the chemist's terms, tubes must resist products with a pH range of 3.5 to 11.

With such a wide range of acidity and alkalinity for products packaged in tubes, there is a tendency on the part of some products to perforate or pit the metal of which the tubes are made. A demand for protective coatings is the result. Continuous experimentation is being carried on by the industry to bring about progress in respect to better coatings.

There are two main types of coating material—thermoplastic coatings and lacquers. Each has its field, although the thermoplastic coating appears to offer greater resistance to contamination over a much broader range of products.

Wax types of thermoplastic are more widely used than lacquers and have proved to be a more stable and

PHOTO COURTESY ALUMINUM CO. OF AMERICA



Shown here (L. to R.) are blind-end tube (compounds); caulking tip, grease tip, screw-eye tip; standard neck; and blind foil orifice. Foil orifice, which prevents seepage and tampering, is pierced with pointed tip of cap.

workable coating so far. Consequently, waxing machines are more highly developed. Performance of wax types depends upon the material used. A marked difference exists between films formed by ordinary waxes and the thermoplastic coatings.

Thermoplastic coating materials are characterized by cohesiveness and continuity of film. They produce good adhesion to the metal tube and are flexible. They are also characterized by a hard surface which resists the abrasion of the filling operation. Thermoplastic coatings reduce the variability in tube performance.

Plastic caps, usually molded from phenolics and ureas, make ideal closures. Recently, important tube users have adopted polyethylene caps for dental and shave creams. The soft plastic is said to eliminate the problem of loose caps and liners.[1] They are relatively the least expensive type, are light in weight, may be ordered in large quantities, are stable enough to permit long storage, take up small storage space and are attractive.

Metal caps have been largely abandoned. Plastic types have found favor because they have greater eye appeal. However, the type of cap and method of manufacture are part of the ordering picture and must be determined by the manufacturer in accordance with his product needs.

[1]See "Poly Caps for Colgate Tubes," MODERN PACKAGING, April, 1954, p. 93.

The Collapsible Tube Manufacturers Assn. has adopted as standard many styles and sizes of caps. These include round mushroom, flanged hexagonal, octagonal, gear or bottle types, eye and nasal tips. A variety of colors can be had, but brown and black phenolics are the least expensive.

Linings for caps are often made of composition cork or pulp that has a vinyl, aluminum, tin or varnished-paper facing.

For heavy ointments, a valve or boss cap proves satisfactory. Blind-end tubes (end must be punctured to release contents) may be desirable.

Screw-eye closure is frequently used for rubber cement, pyroxylin cement, adhesives, etc., where volatility of the contents requires the extra, airtight protection.

Gadget-type closures are said to be numerous and the many such patents applied for may cause a packager to risk possible infringement in adopting a novel closure.

Applicators

Applicators can be integral or separate parts of the tube. They have a wide variety of special forms for specialized purposes.

Nasal-tip tubes are made in different types and are supplied in tin or lead. Tin tubes are suitable for nasal jellies, ointments and any other preparations used on or in the human body, while lead-tip tubes are supplied for oils, greases, rubber cements and similar items.

Pile and vaginal pipes are available in pure Straits tin, aluminum or plastic in sizes that fit standard necks and are obtainable in a variety of styles suitable for products of this nature. Polyethylene applicators for body orifices have been developed and offer certain advantages over metal types.

Eye-tip tubes, often called ophthalmic tubes, are used for eye preparations. These are available in tin or lead and tin tubes are recommended if the preparation is to be used on or near the eye. Lead is only suitable for light lubricants or similar products often supplied in conjunction with eye-tip tubes.

Single-dose tubes are an important unit-of-use container. They do not have a neck nor cap and are designed to contain a quantity of product sufficient for sampling, batching or for one dose, application or serving. The development has included not only the basic neckless container, but new methods of filling, sealing, opening and packing.

Mastitis-tip tubes. A special example of applicator tips are those used in control of the disease, mastitis. The tubes have a very thin, long tip for insertion in the teats of live stock. A relatively new development, the tips facilitate application of the tube's contents.

Wind-up keys are supplied with some products. They are intended to facilitate and control the dispensing of the tube's contents.



PHOTO COURTESY A. B. WIRZ, INC.

The shoulders of these collapsible tubes are colored in gold, black and other eye-catching hues to add sales appeal and distinctiveness to the packages.

Types of fold

The simple or hook fold is the most common type. Ends of tube are given a double fold-over on one side of the tube and then are crimped. A code number may be applied on the crimp. Sometimes a clip is pressed when an especially strong seal is required.

Fold-over-fold-and-reverse, or the A. Colton Standard Fold. This fold produces a four-wall thickness on both sides of the tube. Colton has developed a new fold that doubles up one fold inside another. The advantage of this fold is said to be use of less metal.

Welding-type seal. In this type of seal, the ends of the tube are first flattened and sheared even, then sealed with carbon-arc fuses or other welding methods to form a permanent, hermetic, tamperproof bond.

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Aluminum cans, boxes and drums

by D. B. STROHM*

Aluminum containers perform many special services in packaging. In retail merchandising and in bulk shipping, as functional or as purely decorative packages, rigid or semirigid. Most rigid aluminum packages have a long life expectancy offering re-use value either to the packager or to the consumer. Most semirigid aluminum forms have a specialty use for both packager and product user.

Some idea of the versatility of aluminum containers can be gained from the size range in which they are manufactured. An aluminum container may range from a tiny, two-piece capsule ⅛ in. in diameter by 9/16 in. long to an 8,000-gal.-capacity railway tank car. With that size range, hundreds of products are encased in thin or heavy-walled aluminum containers produced by almost every known metalworking method—drawing, extruding, spinning, stamping, forming and fabricating.

Ornamental aluminum containers, a favorite among many cosmetic packagers, are often finished in a variety of bright, fade-resistant colors, achieved by first subjecting the metal to an electrochemical bath. This process produces an adsorbent oxide coating which may later be colored by treatment with special dye solutions. Many rigid and semirigid aluminum containers produced by impact extrusion in their smaller sizes are competitively priced with other quality packaging materials and offer manufacturers numerous advantages.

Aluminum cans of great length can be produced with a single stroke of an extrusion press. Special equipment and new manufacturing techniques have been developed in the last 10 years which make it possible to produce containers as large as 5 in. in diameter and up to 16 in. long.

The impact-extrusion process lends itself well to finish fabrication in many ways. Special surface-finishing techniques such as polishing, etching or satin finishing, in addition to enameling, lithographing, lacquering or the application of an electrochemical finish, are often applied to containers which are impact extruded.

Popularity of the larger aluminum containers, such as beer barrels, shipping drums and bottles, has increased many times since prewar years. Light weight of the aluminum barrel materially reduces handling and haulage costs; high-purity aluminum liners give greater resistance to corrosion. A 15½-gal. barrel constructed of thicker aluminum sheet than older types has been extremely popular with several leading breweries. Known as the Type D-2 half barrel with a wall thickness of 5/32 in., this unit and the Type D-3 half barrel with a wall thickness of 3/16 in. are produced in smaller diameters for convenience in stacking and transporting. There are also Types C (¼-in. wall thickness) and C-2 (9/32-in. wall thickness) quarter barrels, which possess greater strength and provide packagers with further maintenance economies. All these barrels are adapted to the installation of screw-type fittings for the shipment of chemicals under Interstate Commerce Commission Specification 42-C.

Aluminum drums in 30-, 55- and 110-gal. sizes have found wide peacetime application in transporting chemicals and compounds. Some with a service record of 12 or more years have been used for regular shipments of nitric acid continuously without evidencing appreciable wear or signs of corrosion.

ICC regulations now include specifications for four basic types of aluminum drums. One is known as Type 42-B, a heavy-walled container approved for the shipment of nitric acid having a concentration of 80% and above. The second, of lighter construction, is Type 42-C, approved for the shipment of many flammable liquids. Type 42-D, still lighter, is used for the shipment of hydrogen peroxide and the fourth, Type 42-E, is a single-trip container also approved for hydrogen-peroxide shipments.

Among the chemicals and commodities which are now shipped in aluminum drums, barrels and bottles are acetaldehyde, glacial acetic acid, acetic anhydride, acetone, beer, a birch beer, benzaldehyde, butyl aldehyde, butyric acid, butyric anhydride, essential oils including oil of wintergreen, peppermint oil and methyl salicylate, hydrogen peroxide, lacquers of several types, etc.

* Supervising Chemist, Packaging Laboratory, Aluminum Co. of America, Edgewater, N. J.

PHOTO COURTESY ALUMINUM CO. OF AMERICA



Extruded, drawn or stamped aluminum containers are available in a wide variety of styles, shapes and sizes. Telescope, friction-fit and hinged closures are available to meet a wide range of product dispensing needs. Increasing interest is being shown in cylindrical aluminum containers for aerosols.

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Aluminum-foil packages

by JOHN B. BOWMAN*

Few packaging materials have so captured the public fancy in recent years as aluminum foil, and of the many packaging applications to which foil lends itself, none is so new and few are growing so rapidly as that of rigid aluminum-foil containers. From its humble beginnings as a foil pie plate, the rigid foil container has grown until today hundreds of different containers are available for packaging purposes and new ones are constantly being developed.

The packager who is considering the use of a rigid foil container for his product can simplify his problems and those of his supplier by briefing himself on the characteristics of the material and the advantages and limitations of containers fabricated from it.

Technically, aluminum foil is thin aluminum sheet less than 0.006 in. in thickness and in the grades used in containers it has a purity of about 99.5%. Actually, gauges customarily used in foil containers range from 0.0025 to 0.0125 in., the latter being in reality light aluminum sheet. The rigidity of containers made from it is dependent on the physical design of the container, the gauge of the foil and whether it is hard or soft temper.

Many of the properties of rigid foil containers are directly derived from the properties of foil itself. (See also "Aluminum Foil," p. 124, and the chart, "Properties of Aluminum Foil and Foil Laminations," p. 136.) Aluminum weighs less than one tenth of a pound per cubic inch, melts from 1,190 to 1,215 deg. F., has high heat conductivity and light reflectivity.

Rigid foil containers have a high appearance factor, because of their high reflectivity and resistance to surface damage. Because foil is opaque and will not transmit water vapor, food products remain fresh and resist rancidity, oxidation and shrinkage in rigid foil containers. They are protected from odors and discoloration.

In many industries, particularly those in which the product is, in effect, cast, baked, frozen or otherwise formed in a mold, foil containers lead to great production economies, since they replace conventional re-usable mold equipment with its storage and cleaning problems. In these industries, the foil container then goes on with the product to become the container in which it is stored, shipped, displayed, sold, reheated or reconstituted and in many cases served on the table. Many rigid foil containers have substantial re-use or premium value.

Foil is fabricated into rigid containers by two principal methods: (1) stamping and (2) folding. The containers produced by these two methods are readily distinguishable by their appearance. The stamped or die-formed containers are seamless. The fold-fabricated containers have folded seams at the corners.

Seamless containers

Many containers—and all of those having central ridging or other special shape modifications—are formed by the single stroke of a die into the metal. These containers are customarily referred to as seamless, since they have no folds nor joints. They are identifiable by the characteristic corrugation or wrinkling of the side walls, which gives these containers their considerable strength. In some containers this corrugation is actually controlled to produce a fluted effect. These containers usually have a slight shoulder offset for additional rigidity and are finished at the rim in one of four ways: (1) *raw edge*, (2) *semi-curl*, (3) *full curl* and (4) the *vertical flange*.

The first foil containers had what is known as a raw edge, which is exactly what the name implies. When a raw edge is grooved to add rigidity, it is referred to as trenched. This type rim and its companion the semi-curl (which is simply a raw edge rolled downward slightly to give a skirting effect) are today being superseded by the full-curl rim, which is tightly rolled and beaded, greatly increasing rigidity, and by the vertical flange rim, which is a combination flat flange and vertical projection, designed to receive and crimp over a flat cover.

Since for all practical purposes all round and many rectangular foil containers are made by this seamless method, a wealth of sizes and shapes is available.

Shallow tart pans, used for baked goods, candy and the like, are available in diameters from 3 to 5 in.

Pie plates are made in a variety of shapes and depths and in diameters ranging from 6 to 10 in. Special pizza plates come in 8- and 9-in. sizes.

A variety of deep pie dishes and casseroles are available, most of them in diameters of 5 to 6 in.

Deeper round containers for items such as cakes and pastries are manufactured in diameters from 7 to 9 in.

Rigid foil cups are made in capacities ranging from 2 to 16 oz.

A tremendous variety of rectangular containers, suitable for a multitude of items, such as frozen meat specialties, rolls, spaghetti, meat loaf, fish sticks, fruit cake and many other products, are available. The high acceptance and convenience of the rectangu-

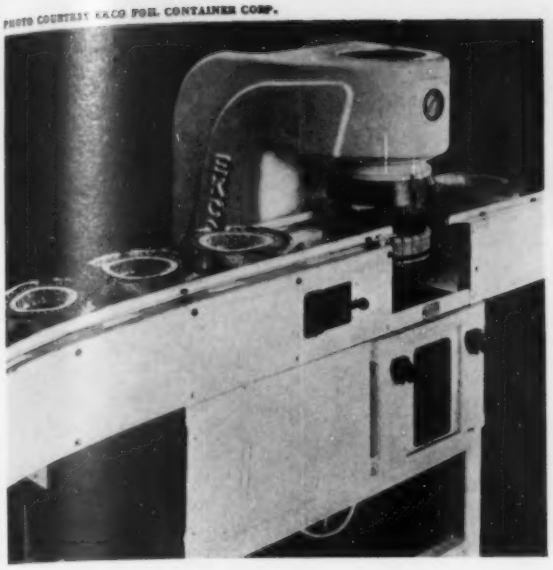
* General Sales Manager, Ekco Foil Container Corp., Chicago.

PHOTO COURTESY EKCO FOIL CONTAINER CORP.



A typical round, seamless rigid foil container with vertical flange, showing the empty container and the completed package with cover crimped under rim of pan.

PHOTO COURTESY KACO FOIL CONTAINER CORP.



Fully automatic closure machine provides high-speed production and low-cost operation. Closure is made as each container is centered under the die. Container is ejected from die to take-off conveyor.

PHOTO COURTESY ALUMINUM FOIL PACKAGING CO.



Foil bake-in pans save storage space, clean-up and packaging labor time for many bakeries.

lar shape in storage and marketing makes this category one of the fastest growing of all. Rectangular containers are made in sizes ranging from 4 by 5 in. to 7 by 11 in.

A category all to itself must be reserved for compartmented dinner plates, which are made both rectangular and round in standard sizes.

While many of these containers are simply overwrapped, the nature of the contents often makes it desirable to incorporate a more rigid cover. These covers are of three general types, depending on the rim style of the container: (1) *flat*, (2) *skirted hood* and (3) the *raised hood*.

The vertical-flange container accepts a perfectly flat lid, usually made of foil-laminated bleached sulphite board. Care should be taken to specify Fourdrinier process board to minimize the possibility of warpage. With particularly attractive products, these covers are often windowed with moistureproof cellophane or Pliofilm. Pliofilm, although slightly more expensive, appears to offer greater dimensional stability in temperature extremes. Some extremely interesting and attractive effects have recently been obtained with the use of solid printed-foil covers.

Another type cover, used with curled-rim containers, is of the skirted-hood type. These hoods are generally made of foil or foil and paper laminates.

Still a third type cover just coming into use is the rigid, skirted, solid-foil raised hood. This hood is, in effect, another foil container inverted, with the skirt crimped in under the rim of the container.

Closure equipment for all of these covers is available from the container manufacturers on a purchase or lease basis. This equipment ranges from hand- and foot-operated machines through semi-automatic and automatic machines, the latter suitable for incorporation in standard production lines. Speeds up to 1,500 packages per hour are being achieved, and continual improvements in speed and reductions in personnel required are being made. Standard conveyor, feed, dating and filler devices are adaptable to the automatic machines.

Folded containers

The other major method of manufacturing rigid foil containers is by the folded method, in which the foil is handled like paperboard and folded into a rectangular shape. These containers are readily identifiable by the folded seams at the corners, their absence of corrugations in the side wall and their flat, hemmed rim. For obvious reasons, folded containers are square or rectangular only. They are available in a variety of sizes. Folded containers have the advantage of being somewhat easier to handle on high-speed overwrapping equipment and their perfectly square corners aid in packing and distributing. Offsetting this is their lack of the reinforcing effect of corrugations and shoulder in the side wall and the rigidity added by the full-curl rim.

Solid-foil recessed covers are available for these containers, as well as a variety of closure equipment. Like the seamless container, their walls are tapered for nesting in shipment.

In general, the packager should choose between these two general types of containers based on specific packaging and marketing characteristics of his products.

The use of foil containers has received its tremendous impetus from the growth of convenience foods, where much of the processing is done by the packer and the housewife need soil neither a pan nor a dish as she heats and serves. Almost every week new food products appear in foil. Fish sticks are being marketed in a special ridged-bottom foil container which serves to brown them evenly. Barbecued frankfurters, shrimp creole, icebox biscuits, lobster Newburgh and hundreds of other food products have added foil's appearance and convenience with substantial sales success. A leading brand of cheese now comes in a rigid foil package, almost solely a testimonial to the high appearance factor of rigid foil.

Technologically this relatively infant industry continues to add utility and sales appeal to its product. It seems likely that tremendous advances will be made in the field of covers and closures, particularly to improve their watertight characteristics and to eliminate labor cost in their application. It seems highly probable that the application of printing directly to the container, forecast first by the printing of a color pattern and then by the appearance of the first flexographic-printed art, will be broadened by improved printing techniques, resulting in the enhancement of the appearance of foil by sparkling full-color product reproductions. New internal coatings and new container designs are extremely probable.

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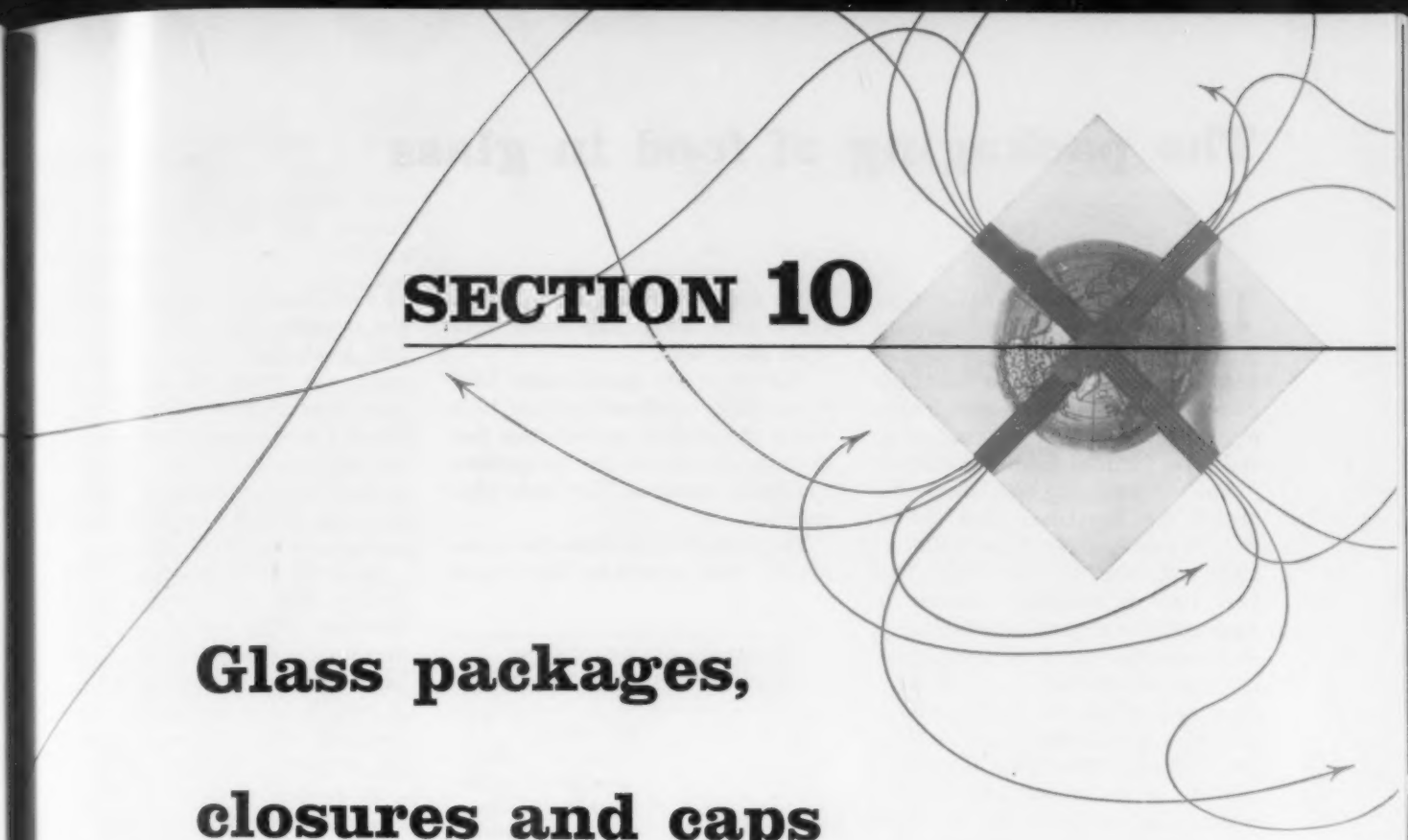
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The packaging of food in glass

by J. S. ALGEO*

The glass container as a food package has shown amazing growth and vitality. This growth has been impressive because it has taken place in the face of fierce competition from other packages, old and new, and other forms of food preservation.

The accompanying table shows the growth that has taken place during the 25-year periods from 1904 to 1929 and from 1929 to 1954. The year 1904 is significant because it represents the approximate beginning of the machine age in glass-container manufacture. Statistics for 1945 have been included in the table because they have special significance in relation to the post-World-War-II growth.

Study of the growth table plainly reveals that not only has the total volume of glass food containers increased enormously but also that the percentage of food containers to total containers has nearly doubled since 1904. Even more importantly the per capita usage has multiplied nearly 10 times since 1904 and nearly four times since 1929.

The per capita growth since 1929 is especially significant because 1929 was in the modern era and since that time the growth of new competitive packaging materials has been phenomenal.

The year 1945 is shown for a reason. We were at war and the volume of food containers did not represent the normal volume. Yet in spite of this non-typical bulge in 1945 and other war years, the loss has been more than replaced. The war established a new plateau from which we are still ascending. The actual volume of glass food containers in 1954 was in excess of 20% over 1945 and per capita consumption was up 4%.

GLASS FOOD CONTAINERS—GROWTH OF SHIPMENTS AND USE[1]

	Shipments	*Percentage ratio to total glass-container shipments*	*Per capita usage, units*
1904	377 million	22.00%	4.36
1929	1,409 million	32.30	11.74
1945	5,639 million	37.80	40.28
1954	6,819 million	40.13	41.83

[1] Does not include figures for milk bottles.



PHOTO COURTESY GLASS CONTAINER MFRS. INST.

Foods that are good to look at and foods of premium quality find glass an especially advantageous modern container. Protection, visibility and design moldability are major packaging assets of glass.

Naturally there are reasons for the vitality glass has shown as a food container. What are they? The most important reason is the fact that glass has inherent characteristics that make it suitable as a container for foods. Probably the three most important are inertness, visibility, moldability.

By inertness is meant the fact that glass does not take anything from nor add anything to a food or other product. Glass does not take flavor from nor impart flavor to a food. Glass keeps the product in and foreign materials out. The housewife just naturally feels safe when she uses a food from a glass container and she almost automatically transfers food from another package into glass because she has no fear of contamination. Glass also has come to be associated with quality by the housewife, who has the feeling that glass is used to pack premium grades whose unvarying excellence can be exposed to the view of the buyer. She is especially concerned about food for her children and this concern accounts for the fact that most packaged baby foods are in glass.

Visibility is another very valuable property. Clear crystal glass displays foods in their natural colors. The sight of glass-packed foods has always created a desire to buy, but this quality of visibility is doubly or triply important in today's self-service stores.

Glass is the pre-eminent showcase package for foods. Other modern packages have eye appeal, but glass packed foods are especially inviting because the product can be seen without blurring or distortion.

Moldability is the property of glass that permits it to be formed into innumerable shapes and sizes and without imparing its other properties. Glass contafners can be made large or small, tall or squat, narrow mouth

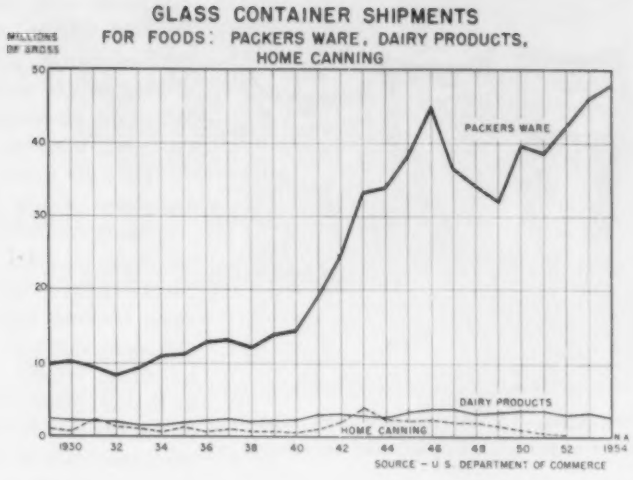
* Vice President, Hazel-Atlas Glass Co., Wheeling, W. Va.

or wide mouth, for liquids or semi-solids, of dimensions suitable for "place" packs such as pickles, olives and sliced fruits, for easy pouring, for stability on the grocer's shelf. Last but not least they can be molded into artistic shapes.

Aside from the natural characteristics of glass, the other reasons for the astounding growth of glass-packed goods are largely due to mechanical developments and to the application of chemistry and physics to glass making. Not only do modern machines make glass containers many times faster than the old-time "blowers" but they also make them lighter, stronger and of more uniform color, more dependable and more suitable.

About 25 years ago typical quart bottles weighed 22 to 24 oz. Today they are 15 to 17 oz. Quart jars were 18 to 20 oz. in weight. Today they are 11 to 13 oz. in weight. Catsup bottles once 12½ to 13½ oz. today weigh 10 oz. It is fair to say that the great volume items of 25 or 30 years ago were one and a half times as heavy as their modern counterparts.

The best and simplest yardstick to use to measure the improvement in quality is to say that in the early 1900s there was an unwritten rule that the packer must expect a 3% breakage. This breakage clause was often put into contracts. When the revolutionary Owens machine came into widespread use, the quality was so much improved that this breakage factor was reduced to 2%. Nowadays, if a packer has a consistent breakage of more than a small fraction of 1%, he finds another supplier.



As to color—uniformity is now the rule rather than the exception. Half a century ago a uniform color could not be maintained. It might range from green through clear crystal to a deep purple.

What effect has the progress in glass manufacture had upon prices? The composite price of 11 large-volume, food-container items is almost the same today as in 1929—being only 1½% higher. This comparison is not on identical items but for jars and bottles used then compared with their modern counterparts—containers that are actually used today. This is a very commendable showing, because costs have increased greatly. The reason glass container costs have not risen, of course, is due to greater efficiency of operations, regardless of other factors; to more economical designs—resulting in lighter weights and higher machine speeds; to standardization and simplification, and to greater total volume and longer production runs.

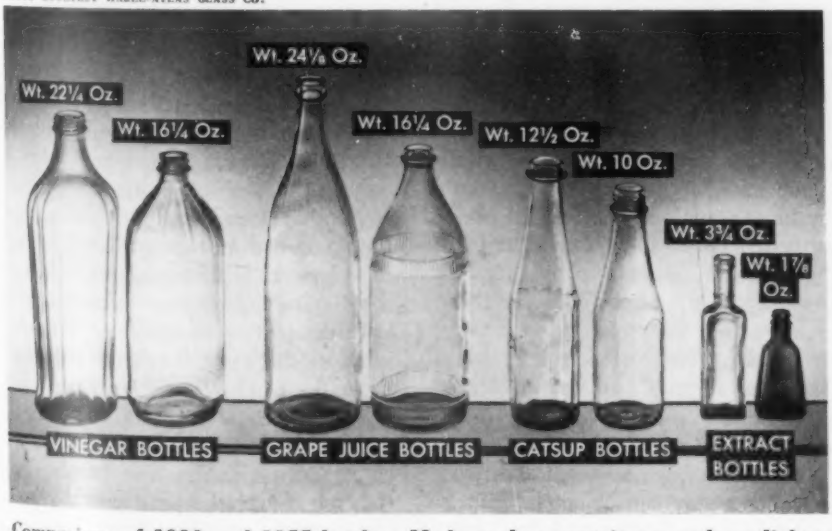
Another substantial reason for the popularity of glass food containers is the improvement in closures and processing methods. (See "Closures for Rigid Containers," p. 365.) An effective, convenient closure is as important as a good bottle or jar insofar as proper food packaging is concerned. The two are inseparable. Excellent closures and improved processing methods plus improved containers not only have brought about immensely higher packaging speeds and a better quality in the product but also have permitted the packing in glass of certain foods and groups of foods which could not have been so packed 50 years ago.

The Pure Food Act of 1906, which required a higher standard of quality in foods, gave impetus to the development of improved methods of preserving foods in glass and thus led to improved closures and processing.

The Pure Food Act was only one of the stimulants to improvement in closures and processes, but the point is that this development has kept pace with advances in the science of glass making. Twenty-five or 30 years ago a line speed of 90 per minute in a food packer's plant was on the high side. Today baby-food jars are run at 500 and more per minute. Speeds of 200 to 350 per minute are common. Closure manufacturers have developed numerous types of gaskets which are suitable for a variety of products. Today with the proper gasket, with high-speed mechanical application, even the screw cap is suitable for nearly all products. The cork which was about the only closure used for bottles—as contrasted with jars—has just about disappeared for food.

Not the least of the reasons for the

PHOTO COURTESY HAZEL-ATLAS GLASS CO.



Comparison of 1930 and 1955 bottles: Modern glass containers made at lighter weights. Corners are more rounded. Bulges and recessed panels are gone.

PHOTO COURTESY HAZEL-ATLAS GLASS CO.



New ideas for re-use tumblers make them a perennially favorite premium.

continued growth in the use of glass food containers has been the standardization of finishes. There just was no standardization 30 years ago. Before that time it was often necessary for the cap man to find out who would make the glass and vice versa before either could proceed. Samples had to be exchanged to make certain container and cap would fit together. Today the glass man can safely make unlimited quantities of containers and the cap man can make unlimited quantities of caps without knowing who will make the other component. The packer can likewise buy caps and glass in confidence from numerous sources by merely specifying the GCMI finish designation, knowing that the one will fit the other. Standardization of finishes has also enabled the packer to get greatly increased line speeds with less downtime. Standardization of finishes is considered so important by the glass-container and closure industries that they are constantly at work on it.

Another great step forward in the science of glass-container manufacture has to do with design or shape. This is often referred to as "standardization" of design, but the word "standardization" is not entirely accurate. What the glass-container manufacturers have tried to do is to reconcile design with practicality. No attempt has been made to establish exact standards for container design, as in the case of glass finishes. Glass finishes have to be made to exact dimensions because caps have to fit them and caps can take up only a limited tolerance. Wisely, no effort was made to freeze containers into a few stereotyped designs. Rather the handling of glass-container design has been confined to an effort to recommend dimensional proportions, contours and decorative features which are most practical from the manufacturing point of view. No effort has been made to rob glass of one of its most important properties—namely, its ability to be molded into innumerable shapes and sizes.

The over-all objective of functionalism, simplicity and beauty in design engineering has for the most part been achieved. Freak food containers have just about disappeared from the scene and, if used at all, are used in small volume. To cite just one example—the old-time vanilla-extract bottle has passed out. That bottle is an extreme example but does serve to illustrate the trend. It had just about every undesirable feature—excessive height related to width and thickness, sharp corners, sunken panels and excessive weight. Besides it was deceptive in appearance.

Present-day design has succeeded in combining beauty with economy of manufacture and with the function of the containers. A container can be made in plain or artistic design, because glass can be molded into many shapes. This is done economically, too, so long as the design is engineered within the limitations of the glass-making machines. Proper design also produces containers that can be filled, capped, labeled and handled at high speeds in a packer's plant. Design flexibility also permits the adaption of styles and shapes to suit a particular product—for instance containers that have sharp shoulders that show off products such as sliced fruits, pickles, olives and lamb's tongue and at the same time prevent floating. Glass containers can be made with a large label area to display a food better. They can be designed from the point of view of the store—for specific stacking and display purposes. Glass containers, too, are designed from the point of view of Mrs. Housewife—to be eye catching and so that she can easily remove the closure and then the contents.

PHOTO COURTESY OWENS-ILLINOIS GLASS CO.



Wide-mouth jars make products easy to reach and are popular for re-use.

Trends

One important rather recent trend, which is accelerating, is the growth of double-use containers. One manifestation is the use of wide-mouth and squat containers from which the food can be removed easily and which can be later used as a refrigerator jar for leftovers or for home freezing. Another trend pointer is the designing of containers sufficiently attractive to permit their being "set" on the table with their original contents.

Another "new direction," probably the most important at the present time, is the use of containers, particularly tumblers and tumbler-shape jars, with applied ceramic colors. Glass has another valuable characteristic not mentioned before—namely its ability to take a permanent color decoration. These colors blend perfectly with the beautiful crystal color of the glass. The glass food container is by far and away the most outstanding of all premium and re-use packages. Its merchandising potentials in this respect are practically inexhaustible for new "themes" are born with the times. Today's successful decorations give expression to current vogues, depicting comic-strip or other famous characters—Donald Duck, Howdy Doody and lately Davy Crockett. Jingles, songs, historical events, antique cars or other nostalgic memorabilia keep the stream of ideas ever fresh and sales potent. Many of the decorations appeal chiefly to children, but then children exert a profound influence on the purchasing agent, the Mother—and what better time is there to win customers than when they're young?

Another trend in glass packaging has to do with economy of shelf space in the store. Containers, notably jars, for the past few years have tended toward squatter designs and with an interlock between the bottom of the jar and the closure for easier stacking, greater stability and more tiers to the shelf. Extra-tall bottles have largely disappeared. The whole design trend over the past several years has been to squatter shapes both as to bottles and jars.

Another trend starting several years ago and still increasing is the use of tumbler-shape jars. These jars are made in extra-light weights and with a simple bead finish to simulate high-grade drinking tumblers.

The trend toward putting more food products and varieties of products in glass containers continues to grow. Go into any grocery store and especially into a supermarket and you will see not only the old timers—jellies, jams, pickles, mustard, syrups, catsups, vinegars and others—but also many products which were not packed in glass a generation ago—some of them have appeared in glass within the last year or two. Processed foods were packed in glass in a very limited manner a generation ago. Now they are plentiful. Following is a partial list—some go back a few years, others are quite recent—baby-food meat products, baby juices, powdered milks, instant coffee and tea, powdered cream, citrus-fruit segments, orange juice, cake icings, pie fillings, frozen meats, gelatin salads, meat tenderizer, "popped" popcorn and nuts. This trend is accelerating.

The future of the glass food container is bright. Glass has so many natural and favorable properties that only shortsightedness and failure to capitalize on them will stunt future growth. But the glass man is not shortsighted and certainly the merchandiser or packager cannot afford to be. The techniques of making and handling glass are constantly improving. Refinements in the present methods of forming containers will bring about high machine speeds and improved quality, but it is entirely probable that a revolutionary method, quite unlike the present one, will be developed whereby containers will be made at speed considered phenomenal by present-day standards and to a degree of preciseness not attainable today.

The efficiency of closures is constantly being improved and new ones being developed. Machines for filling, capping, labeling and casing are being perfected. New methods of processing food products have been developed in recent years and more are to come. Handling equipment in the packer's plant, exclusive of the filling line, is being improved. Glass handling speeds and efficiencies are out of the horse-and-buggy era. This has largely eliminated the problem of breakage.

Scott Plastics CLOSURES

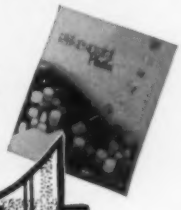
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COMPANY Wheeling, W. Va.

The packaging of beverages in glass

by JOHN FISHER*

The glass bottle is the favorite package in the beverage field. Virtually 100% of all wines and liquors, more than 98% of all soft drinks and about 70% of all packaged beer in the United States in 1954 was in glass. To meet these packaging requirements glass-container manufacturers during 1954 shipped beverage bottlers 4⅛-billion bottles—almost 25% of all glass-container shipments.

However, yearly shipment figures fail to give a complete picture of the tremendous use of glass containers in the beverage field, because the vast majority of soft-drink bottles and a large portion of beer bottles are re-used many times. For example, while soft-drink bottlers purchased more than one-billion containers during 1954, Americans consumed, during that same year, almost 28-billion bottles of soft drinks—more than 170 per capita.

This tremendous usage is quite understandable for a glass container possesses a combination of unique qualities which make it the ideal beverage package. It is chemically inert, transparent, nonporous, sanitary and odorless—and it is the only container which possesses all these attributes. Glass adds nothing nor takes nothing from products packed in it. Because of these qualities, glass is the only feasible container for some beverages.

* Vice President in Charge of Marketing, Ball Bros. Co., Inc., Muncie, Ind.

Liquors and wines

For example, no other package has yet proved to be entirely satisfactory for whiskeys, wines, cordials, etc. And the history of this industry reveals that the bottle—its shape, color, size—has always been a powerful factor in the distribution of the product. Colorful collections of old-time bottles used by early civilizations offer evidence that men have always preferred to have their spirits in bottles.

Individuality and variation start with size. In use today are liquor bottles varying from 1⅜-oz. miniatures to gallon containers. The most popular sizes for liquor are the half-pint and pint flasks, ⅕ quart and quart bottles. For wines, the ⅘ pint, pint, ⅘ quart and quart are the most popular. However, decanters and half-gallon and gallon containers are becoming increasingly important for both dessert and table wines.

Variations in the shape and style of whiskey bottles are numerous. However, most of the distinctive private-mold packages are stylized variations of the traditional round bottles. Packages for other liquors, such as brandy, rum, crème de cacao, crème de menthe, kümmel, anisette, and rock and rye, tend to follow designs which are more or less traditional for the particular liquor.

Many factors affect the size, shape and color of a wine bottle. Some packages are strictly traditional—the original reason for the design being long since forgotten. Also, some wines require a special type of bottle because of the particular process used in making and aging the wine. As a result, there are many bottles with deep push-up bottoms, with extremely long necks or other special features.

In general, there has been very little change in the traditional design of wine bottles. However, some modifications considered essential for today's functional packages are being made. There is a trend in the fifth and quart packages toward a slender round bottle with a tall label panel. This makes a large-appearing package and one that is easy to grasp. In addition, it provides plenty of space for a bill-

PHOTO COURTESY BALL BROTHERS CO., INC.



Slender, round wine bottles with a tall label panel are growing in popularity because of their smart appearance.

PHOTO COURTESY GLASS CONTAINERS MFRS. INSTITUTE



Typical American beverage in a typical container is the good-to-look-at bottled soft drink.

CALL *Ball* and GET MORE THAN GLASS!



BALL CONTAINER DESIGN COUNSEL

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board-type label. In some of the larger sizes there has been an increase in the use of decanter-shaped bottles with easy-to-grasp-and-pour, pitcher-type handles. These have become popular both because of their convenience in handling and pouring and their re-use attractions.

Perhaps the most striking development in liquor packaging in recent years has been the widespread use of decanters during the holiday season. Because the use of these containers is still seasonal, only a small percentage of the total amount of liquor packaged goes into these specialized containers. However, a few distillers are making their product available year 'round in gift containers.

Malt beverages

In contrast with the liquor field in which individualized containers are the rule, virtually all the containers used for malt beverages are of stock-mold design. This holds true for both the returnable and the one-way types.

The returnable bottle in most common use is the export shape. Others in general use are the select, the steinie and the stubby as well as the traditional styles for porter, ale and stout. One-way bottle styles commonly used are the export and the select one way.

This standardization of containers, however, has not eliminated individualized packages. Colorful, attractive labels, neck bands, carry-home cartons, etc. are skillfully combined to produce packages with individuality.

As far as the size is concerned the 12-oz. bottle is by far the most popular. Next in line of popularity is the 1-qt. size. Other sizes used—although in limited quantities—are the 16 oz. and the so-called split bottles (under 12 oz.) in 6-, 7- and 8-oz. sizes. In many states the sizes which may be used are regulated by the state.

Returnable beer bottles, which are used many times (they average about 18 trips), are by far the most economical package in this field. More than half of all packaged beer sold "goes to market" in returnable bottles. Since its introduction in 1938, the no-deposit, one-way beer bottle has grown steadily in popularity. In 1954, for example, glass manufacturers shipped to brewers more than 1.1-billion non-returnable bottles.

Soft drinks

If there is a typical American beverage it is the "soft drink." Consumed by persons of all ages, in all sections of the country and during all seasons of the year, bottled soft drinks have chalked up, during the last two decades, a record of rapid and constant growth. Since 1935 annual consumption has increased from 4¾ billion to 28-billion bottles—a per-capita increase from 37 to 172 bottles.

The bottles which carry this product to the user can be divided into two classifications—the stock designs available to any bottler and the private-mold or franchise designs developed by the parent beverage companies and made available only to the franchised bottler of the particular beverage. These bottles—especially the franchised items—vary greatly in appearance. Some have decorative designs blown into the bottle itself. In others, decorative patterns with a stippled or knurled effect are worked in over all or part of the bottle. All these decorative devices are, however, applied to variations of the "round" bottle, for other shapes do not perform as satisfactorily as "pressure" containers.

Applied-color labels are likewise used in a great many cases as a means of decorating and labeling soft-drink bottles. This type of labeling is especially well suited to returnable beverage bottles. One important consideration is economy. Cleaning off old labels and relabeling requires considerably more processing and handling and that results in increased production costs.

Applied-color labels have other advantages over paper labels. For example, the product itself can be more clearly seen and the sales appeal of glass as a transparent package with its own refractive powers is maintained. (See "Marking Glass Containers," p. 384.)

Variety is likewise the rule as far as capacity is concerned. Bottle sizes commonly used are 6, 7, 8, 10, 12, 16, 26, 28 and 32 oz. The finish used on virtually all soft-drink bottles is the standard 26-600 crown finish. (The first two digits designate the outer diameter of the neck of the bottle measured in millimeters. The digits following the dash designate the standard design of the bottle as specified on a master drawing on file with the Glass Container Manufacturers Institute—GCMI. Thus, this bottle has a 26-mm finish and it is GCMI Style No. 600.)

The vast majority of bottles used in the soft-drink industry are of the returnable type. Because distribution of soft-drink bottles is usually local in nature, the returnable bottle contributes greatly toward economy. During 1954, for example, seven returnable bottles were shipped for every one non-returnable.

Use of the one-way bottle has generally been confined to the 12-, 24-, 28- and 32-oz. containers. While shipments of non-returnables for soft drinks are still comparatively small, they have grown steadily—but quite rapidly percentagewise—since 1948. However, the ability and willingness of either the bottler or the consumer to absorb the cost of the one-way

PHOTO COURTESY BALL BROTHERS CO., INC.



Popular-style beer bottles include (l. to r.) the export, quart, select and the 7-oz. split.

PHOTO COURTESY OWENS-ILLINOIS GLASS CO.



Modern package for White Rock beverage is the family-size one-way bottle.

soft-drink bottle has as yet not been conclusively established.

Lighter-weight bottles

In the liquor and malt-beverage industries there has been a definite trend toward the use of lighter-weight bottles. During the late 1940s, as sales became more and more competitive and as costs of labor, supplies and services increased, distillers and brewers began to seek methods of reducing their costs. One avenue they explored was the possibility of using lighter-weight bottles.

Glass-company engineering departments tackled the problem with vigor and the resulting improvements in glass technology have made possible the production of lighter-weight bottles which are as satisfactory as the heavier ones in general use previously. Light-weighting has forced improvement in glass distribution, which in turn has made today's light-weight container less susceptible to impact breakage.

The bottler has saved money not only through the lower cost of the bottles themselves but also as a result of the lower shipping costs which the lighter-weight bottle made possible. Because of the savings realized, the trend toward lighter-weight bottles has been greatly accelerated during the past few years—especially in the liquor industry.

Surface coatings

"Save the surface and save all." This slogan of the paint industry can well be applied to glass containers, for glass technicians are generally agreed that the strength of a glass container lies in its surface and that the path to improving glass-container strength lies in the direction of preserving its glassy surface. As a result, much work has been done in recent years to develop surface coatings which would preserve the virginity of the glass surface.

In the beverage field these surface coatings were used first on beer bottles. The outside surface of the bottle was treated with sulphur-dioxide gas or plain sulphur converted to sulphur-dioxide gas by heat from the lehr. The sulphur combines with the sodium present on the surface of the glass container. In so doing, it provides a relatively smooth and more impervious surface condition which has a reduced coefficient of friction and actually gives the bottle a slick feel. The over-all effect is to minimize the probability of scratching the glass surface.

The sulphur coating is instantly soluble and readily rinses off. However, it provides protection for the bottle as it passes through the lehr, at the point of selection in the glass house, during shipment to the bottler and up to the point of the bottler's washing line, where the surface is removed. Performance on the bottler's filling lines is improved, because little imperfections caused by handling the new bottles are not present. Further, the chemical reaction between the sulphur and the components of the glass leaves a somewhat hardened surface even after the coating is rinsed.

Other known coatings, such as the waxes and the glycols, perform only a perfunctory and mechanical function in that there is no chemical reaction with the surface of the glass container. These two coatings are primarily lubricants and are readily removed by washing. They could, in a sense, be used as surface protectants for single-trip containers, but would not provide any considerable protection following such operations as applied-color labeling or washing.

Silicone coating, which is considerably more efficient as far as the mechanical bond which results between the coating and the glass surface is concerned, has some protective effect on the surface of a container even after a rinsing or washing operation. Such a coating would not, however, continue to exert any protective action after the application of color labeling.

Where glued labels are applied to silicone-coated containers, special types of glues are required to assure satisfactory adherence of the labels to the glass. Finally, silicone coating, even though not soluble in water, ultimately wears off because of the micro-thinness of the coating.

Selection and procurement

Perhaps the most important consideration in the selection and procurement of a beverage container is to select one which will protect the bottler's product from every outside influence. No package should be selected if there is even a remote chance that it will adversely affect the quality or taste of the product, for the bottler's reputation and success depend on the maintenance of those properties.

The next step is to determine the design of the package. Where firms have been using a standard design and wish only to continue its use, this step presents no problem. The selection of a container of new design, however, requires careful consideration of several points—the function of the package in the retail store, its operating efficiency and its consumer utility. Some glass-container manufacturers maintain package-design departments which will assist the bottler in creating a distinctive package for his product.

Because modern merchandising is about 85% self service a good package has to stand out—has to say "take me" more appealingly than competitive packages. It has to be readily visible under varying conditions of display and lighting. But the package should be more than just an attention getter. It must draw *favorable* attention, should express the personality of the product—enable the quality of the product to become self-evident to the shopper.

The package chosen must also be designed so that it will perform satisfactorily on the users' filling lines and will withstand the rigors of handling, warehousing and shipping. In that connection, it is interesting to note that the modern glass container is capable of standing much more abuse than is generally believed. Bearing out the fact that glass containers are no longer unduly fragile, is the Final Report of the Transportation and Packaging Survey sponsored by the railroads of the United States and the Fibre Box Association. This revealed that freight claims on foods and beverages in glass averaged only $10 per car—much lower than the average of all commodities checked by the railroads, which showed an average claim of $29 per car.

Satisfactory performance depends on more than design. The bottler wants ware that will meet his quality specifications and the type of service that assures delivery of the ware he wants when he wants it.

The beverage bottler must also consider the consumer utility of the package he selects. The package should be functional—designed to be a convenient and efficient container for the specific uses to which it will be put. While it is less true in the beverage field than in many others, consideration should also be given to the possible uses the consumer can make of the package after it has served its original purpose.



How this broad packaging line can be important to you



No matter what you pack in glass, you'll find just about any component your package requires in the Armstrong line. And, by using such a broad line as a source of supply, you gain these important advantages:

You fix responsibility. When the same manufacturer makes both bottle *and* closure, it's up to him to answer for the way the whole package performs.

And you buy know-how. Knowing glass is basic to making better closures . . . and vice versa. That's why it pays to buy both from a source that makes both.

The complete Armstrong line includes: containers in flint or amber glass, plastic vials, metal caps, plastic caps, Hi-Speed® Crowns, embossed-top or plastic-top corks, and straight and tapered corks of all kinds. Du Pont "Cel-O-Seal"* Bands and "Wind-O-Band"* Seals are also available.

The packaging service doesn't end there, however. You'll find your order will be there when you want it. And when production problems of any kind crop up on your lines, our engineers are at your service to help smooth them out. See your Armstrong man today or write Armstrong Cork Company, Glass and Closure Division, 5500 Crystal St., Lancaster, Pa.

Armstrong

PACKAGING SERVICE

*E. I. DU PONT DE NEMOURS & CO., INC.

Glass containers for drugs and cosmetics

by S. W. MENEFEE, JR.*

PHOTO COURTESY MERCK & CO., INC.



Drug packaging demands have few parallels for protection and exactness. Glass meets these demands in many ways.



In cosmetic packaging the container has a very intimate relationship to sales and satisfying product use.

Drug and cosmetic manufacturers and persons responsible for packaging the products of these industries are particularly interested in the physical and functional qualities of glass containers. Glass containers are inexpensive and universally available; glass containers are chemically inert; they will not diffuse vapors or liquids and they can be hermetically sealed. Glass containers can be manufactured in an almost unlimited range of sizes and shapes to fit the dimensional and quantitative requirements of a product. The rigidity and sturdiness of glass affords utmost protection against crushing and insidious hidden damage to the package or contents.

* Manager, Package Design and Merchandising, Glass & Closure Div., Armstrong Cork Co., Lancaster, Pa.

Drug containers

Glass containers are a practical and often a specific necessity for meeting the complex packaging requirements of the drug industry which is composed of manufacturers and distributors of ethical pharmaceuticals, proprietary drugs, and household and industrial chemicals. The products of the industry are divided into two classifications—liquids and dries. Official standards for the identity, strength, quality and purity, preparation, protection and packaging of substances for medicinal use are outlined in the United States Pharmacopoeia and enforced under the Federal Food Drug and Cosmetic Act.

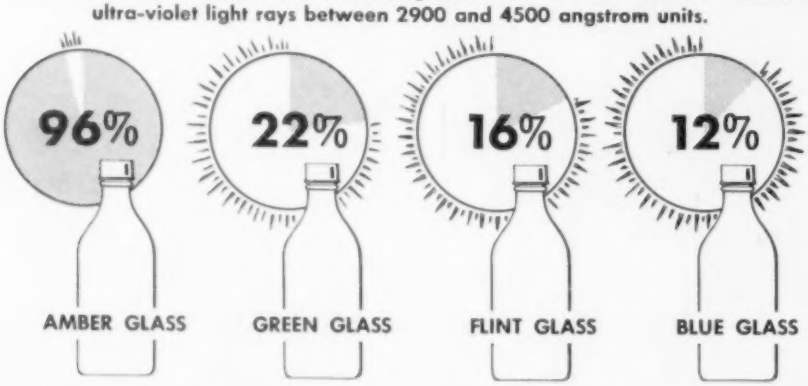
The packager need not be restricted in the choice of glass containers, for there are literally scores of types from which to choose. His area of choice becomes almost limitless when the variety of designs available in private molds is considered.

Realistically, however, there are a number of limiting factors that the packager should consider in choosing a container. His choice can be a most important one, since over-all packaging cost, production-line performance, potential sale of the product and the like depend upon the container used. An important consideration is the location of his glass suppliers and the transportation facilities affecting delivery schedules.

DIAGRAM COURTESY ARMSTRONG CORK CO.

ULTRA-VIOLET LIGHT TRANSMISSION RESISTANCE OF GLASS COLORS

Percent of resistance of typical commercial glass colors in 2.0 millimeter thickness to ultra-violet light rays between 2900 and 4500 angstrom units.



The U. S. Pharmacopoeia indicates that light resistant glass containers must not transmit light rays between 2900 and 4500 angstrom units in excess of 10% in a 2.0 millimeter thickness.

Light resistance

Glass containers for drug use are generally available in clear flint or amber color. Blue, emerald green and opal glass colors may be obtained from a limited number of sources. However, blue, green and flint glasses transmit ultraviolet light (spectrum radiation between 2,900 and 4,500 angstrom units) almost as well as they

© E. I. DU PONT DE NEMOURS & CO., INC.

do visible light. Consequently, amber is the only commercial glass color which gives pharmaceuticals the required amount of protection under USP specifications for light-resistant containers. (See chart on opposite page: "Ultra-Violet Transmission Resistance of Glass Colors.")

Liquids

Generally speaking, the packager will find it advantageous to use a minimum number of sizes of glass containers to market his product. Since the price of glass containers is based on volume produced at one time, it will be economical for the packager to confine his line to the fewest number of sizes of containers which can be manufactured in production runs large enough to warrant the lowest price. In addition, the fewer the sizes used, the simpler becomes the inventory and stocking problem of the manufacturer, the wholesaler and the retailer.

Similar advantages are to be gained from keeping closure sizes to fit the various bottle sizes at a minimum. By concentrating on a few sizes, it may be possible to order closures in sufficient volume to attain the minimum price. In addition, limiting the number of closure sizes achieves production savings through less-frequent production-line change-overs in filling and capping. Savings also accrue in inventory space and handling.

The packer must determine his need for either stock-mold or private-mold glass containers to meet his merchandising objectives. Frequently, stock-mold containers will be entirely satisfactory, but, where a special functional characteristic or brand identity is desired, private-design containers are desirable. The cost of molds for private-design glass containers ranges between $1,200 and $3,000, depending on the size, shape and amount of surface decoration.

Shape of the glass container is important. Round bottles are priced lower than oval, oblong or square bottles. Rounds are strongest in resistance to internal pressure and external impact and straight-sided round bottles lend themselves to the highest-speed labeling.

Oblong and square bottles are frequently referred to as "space savers" because they require less shelf space than rounds. Broad label area on oblongs provides excellent shelf visibility and some oblong bottles are designed for labeling on the edges for supplementary identification either on the dealer's shelf or when placed edgeways in the home medicine cabinet.

The shape of the shoulder, neck and bottle finish should be funnel-like to achieve good pouring characteristics. Sometimes a special finish with an undercut lip is used to facilitate pouring and cutoff of the liquid.

In drug packages, the bottle neck and closure can be designed for easy application of cellulose secondary seals, which are both decorative and help assure tamperproof delivery.

In purchasing solution bottles for parenteral products, private-mold containers are usually required. The glass manufacturers are usually required to sulphur treat the bottles to reduce alkaline solubility. Great care should be exercised in the fit of the closure and in the length of the glass air-vent tubing usually found in this type of bottle.

Packagers of citrate of magnesia may purchase stock citrate bottles or may package the product in low-cost, non-returnable bottles.

Packagers of products which are dispensed from dropper bottles must determine whether or not the rubber-bulbed dropper assembly can be safely used as a primary seal on the package.

Dries

The packager of dries also should attempt, in the interests of economy, to limit the number of sizes of glass containers and closures. Stock molds should be used wherever practical.

In packing dry products, such as tablets and capsules, careful consideration should be given to the use of cotton, plastic or paper-folder stuffing as a means of reducing the number of sizes of containers required to pack a line of dries. Within broad limits, the manufacturer may employ the use of cotton stuffing at the top of the container of capsules or tablets to minimize the number of container sizes required and thus gain the advantage of minimum price and inventory space saving by larger purchases of fewer sizes.

Careful analysis of the size of closures should be made to determine the minimum size required for the maximum filling speed. Sometimes the economy of a small-size closure is more than offset by the cost of reduced filling speed.

Careful consideration should be given to the shoulder design of wide-mouth containers to facilitate delivery of the contents in the case of powders, tablets or capsules.

Shape of wide-mouth bottles and jars should be analyzed in relation to cost and label-space requirements.

Packers of pre-natal capsules may wish to consider the use of standard sizes of wide-mouth nursing bottles in order to provide the consumer with a re-usable package.

Packagers of ointments must regulate the height of glass jars in relation to ease of extraction of the product with the fingers.

Another consideration in the packaging of proprietary ointments is the desirability of including a stacking feature so that the bottom of the glass jar will interlock with the cap to facilitate shelf or counter display.

Cosmetic containers

Since the products of the cosmetic industry are concerned chiefly with the ingredients of "beauty" and of

PHOTO COURTESY OWENS-ILLINOIS GLASS CO.



Common prescription packages are emerald green dropper bottle, a vial, dry prescription square, ointment jar and clear flint oval and vial.

PHOTO COURTESY CONTINENTAL FILLING CORP.



Future developments in cosmetic and pharmaceutical aerosols will more and more involve glass containers.

PHOTO COURTESY T. C. WHEATON CO.



Vials have many specialized jobs in packaging. Properties can be tailored to requirements for brightness, clarity, and strength.

catering to the dictates of good grooming, the versatility of design and decoration provided by glass becomes highly important. Glass containers may be manufactured in a multiplicity of shapes, designs and contours. These design characteristics may be utilized to enhance the display of the product, stimulate impulse-buying appeal and offer consumer convenience or utility.

Of all standard packaging materials, glass possesses the hardest, smoothest, most durable and most scratch-resistant surface. This exclusive feature assures the continued new appearance and sparkling clarity of the glass container through repeated handling during packing, point of sale and ultimate use in the consumer's home. Chemically inert glass containers have no deleterious effect on ingredients and can be hermetically sealed for preservation and control of essential oils, odors and spicy fragrances as originally packed by the cosmetic manufacturer.

Most cosmetic manufacturers and packagers fully realize the importance of the package—for competitive merchandising, for stimulation of impulse buying, for adaptability to mass displays and stacking, and the like. Cosmetic packages are probably receiving more top-level attention today than ever before as demonstrated by the eye-catching exhibits of cosmetic lines on store counters and shelves.

PHOTO COURTESY OWENS-ILLINOIS GLASS CO.



"Color-break" ampul parts clean and even without need for filing.

Selecting containers for cosmetics

The cosmetic packager must first determine the desirability of using open-stock molds or developing private-design molds for packaging his products. Open-stock, glass-container molds are available in a wide range of sizes and shapes, suitable for introducing and market testing new items, for packaging products of limited volume or where the cost of the container is a critical factor.

When large volume is established and major advertising promotions are involved it is usually desirable to develop private-design containers to assist product and brand identity.

The packager will find the glass industry prepared to offer design service for private-mold glass containers or to cooperate closely and confidentially with package-design consultants of the packager's choice in development of new designs.

On mass-market cosmetics, such as shampoos, shave lotions and hand creams, the packager must carefully analyze his need for high-speed filling-line performance in relation to his desire for unusual container shapes.

Modification of container contours and shapes may be necessary to secure uniform glass wall distribution and basic stability for successful operation on a high-speed filling line.

The cosmetic packager will have a greater choice of labeling methods than is found in other industries. Glass containers can be labeled with paper, foil, decalcomania of either air-dryed or ceramic fired-on type. Ceramic decals and silk-screen labels are fired onto the surface of the glass for permanent identification.

An investigation of the surface coating and decorating of glass containers produces an unlimited number of new and attractive effects. Glass containers can be decorated with an over-all spray coating of ceramic colors to produce anything from a frosted surface to various shades of opaque and translucent solid colors. It is also possible to decorate the surface with metallic coatings resembling gold, silver or copper, or with various pearlescent effects. In addition to the over-all coatings, a secondary color can be applied by silk screen or random spray veiling.

New design trends in glass containers favor modern simplicity of form suitable for high-speed packing lines over designs of unusual shape with structural weaknesses. There is a definite design trend toward greater consumer convenience and utility, such as providing non-slip hand grip and more convenient shapes for carrying in traveling kits or storing in the medicine cabinet. The packer should carefully analyze the need for consumer-convenience features which can be successfully promoted with substantial advertising campaigns.

Where cosmetic packages are sold in self-service retail outlets, the importance of providing a price stamping area on the top of the closure or on the individual folding carton must not be overlooked. Self-service retail outlets require careful consideration of package design for space conservation, ease of shelf stocking and distinctive display possibilities.

Special design consideration may be required to develop "twin-pack" or "companion trial-pack" glass packages that are held together in a single sales unit by means of a folding carton, a shrink-on cellulose band or adhesive tape. Where two bottles of different sizes are to be packed as a promotional unit, consideration must be given to display frontage and sales message, convenient handling by the dealer and final easy separation.

The chemical inertness of glass containers has also opened up new possibilities for low-pressure glass aerosol containers for spray dispensing of such products as colognes, anti-perspirants and hair preparations. Glass aerosol containers are manufactured and sold both with and without protective surface coatings. (See article on aerosols, p. 319.)

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Sturdy CELON Cellulose Seals give any glass packed product real protection. Sized right, with controlled shrinkage, CELONS dry to the snug, tight fit that keeps dust and dirt seepage *out;* freshness, flavor, aroma sealed-*in.* The outstanding craftsmanship you get in *decorated* CELONS assures greater beauty for the package. Wording is clean, sharp, *readable.* Designs . . even when intricate . . are precise, eye-stopping. Whites are sparkling bright, colors are rich. Because the decorations are impregnated into the cellulose as it is manufactured, they stay put . . do not rub or wear off. Guard against sampling and substitution . . maintain product purity and integrity . . cut returned-goods losses . . add merchandising power . . CELON-Seal all your glass packed packages.

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At the right, see how easily the bottle opener removes crown cap and Celon-Seal, in one operation, from beer bottles. Bottle necks are kept clean so consumers can drink directly from the sanitary-sealed bottles. • On the Ganatrex bottle, the Celon Seal carries a reminder of the end-use of the product . . makes extra sales, reminds clerks and consumers of the product purpose, important on over-crowded druggists' shelves. • The Regina Wine Vinegar Celon does double work . . sells the features of the Vinegar, and holds on a recipe booklet, firmly attaching it to the bottle. • At the left, the exciting new CELON perforated tear strips, with tabs, that now make a bottle as easy to open as unsealing a cigarette package! Decorations stay put for the life of the package.



See for Yourself

If you'll send us a sample bottle, we will promptly CELON-Seal and return it for your inspection. Decoration ideas by our long-experienced design staff will be included, without obligation, of course.







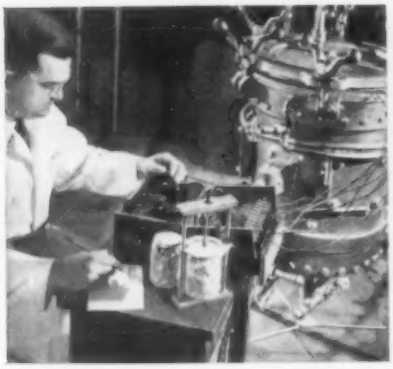
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Owens-Illinois Assures You A



Co-ordinated Research

Pure research into formulae and fabrication of glass, *packaging research* into processing and handling methods in customer plants, and *market research* into consumer attitudes, add up to greater specific value for your packaging dollar.



Engineered Design

The package that takes your product to market must take *three* needs into account. Considerations of its function in the retail store, its operating efficiency and its consumer utility all become a part of the prescription for an Owens-Illinois package.



The Right Container

Versatility of facilities enables Owens-Illinois to supply containers to meet special needs: Duraglas containers for almost any item; Libbey Safedge packing tumblers or premiums; Kimble Ampuls and Vials; and a variety of Owens-Illinois plastic containers.

Good Package Design



Owens-Illinois pioneered in designing the decanter bottle, a salesmaking innovation which has been adopted by more and more distillers each year. Most of the packages, illustrated here, were designed by Owens-Illinois . . . all of them were made by Owens-Illinois.

COMPLETE PACKAGING APPROACH



The Right Closure

Know-how as to the best available liner and closure—best for packing, displaying, or using a specific product—may well be one of the most important single points through which expert packaging counsel will reward you many times over.



Needed Fitments

With emphasis on the word "needed," Owens-Illinois specialists are keenly aware of sales benefits possible through use of plastic shaker and pour-out fitments which are not "gadgets" but which increase consumer satisfaction with your product.



Merchandising Cartons

Modern cartons are developed only through systematic consideration of their opportunity to serve you in the retail store and retail warehouse as well as on your own filling line and in transit. Owens-Illinois is pioneering such developments.

puts your Product Front and Center



Owens-Illinois engineered design creates containers that do their 3 jobs well

Your product gets every "assist" a container can give it when you put it in Duraglas salespackage.

This is because these containers are planned and created like an engineering project. They have "looks"... they attract... they sell. They do their jobs well . . . give your product complete protection and seal its high quality securely in. And, what's more, they please the buyer by being functional . . . easy to handle . . . easy to use.

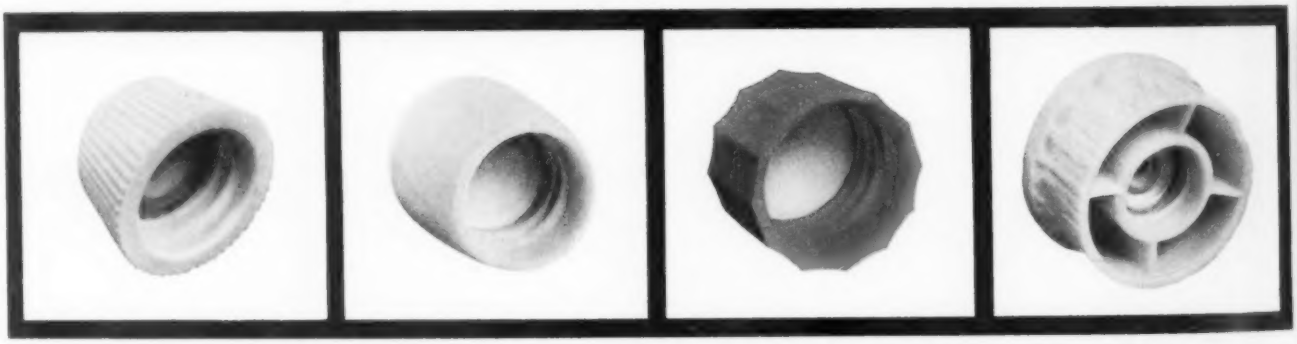
You can count on Owens-Illinois as a marketing minded supplier of glass packages of all types, capacities and designs both stock and custom.

DURAGLAS CONTAINERS
AN (I) PRODUCT

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GENERAL OFFICES · TOLEDO 1, OHIO

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. . . because BEETLE is *limitless* in color—can be had in any shade or tint to match precisely, or contrast with your packaging color theme for instant eye-appeal

. . . because BEETLE is so smooth and inviting to touch, with a quality "feel" that gives instant touch-appeal

. . . because BEETLE has high display value (permanent, lustrous finish) —and it won't attract dust on counters

. . . because BEETLE closures give such a tight seal, won't back up on threads —*even on plastic squeeze bottles*

. . . because BEETLE is non-staining, chemical-resistant

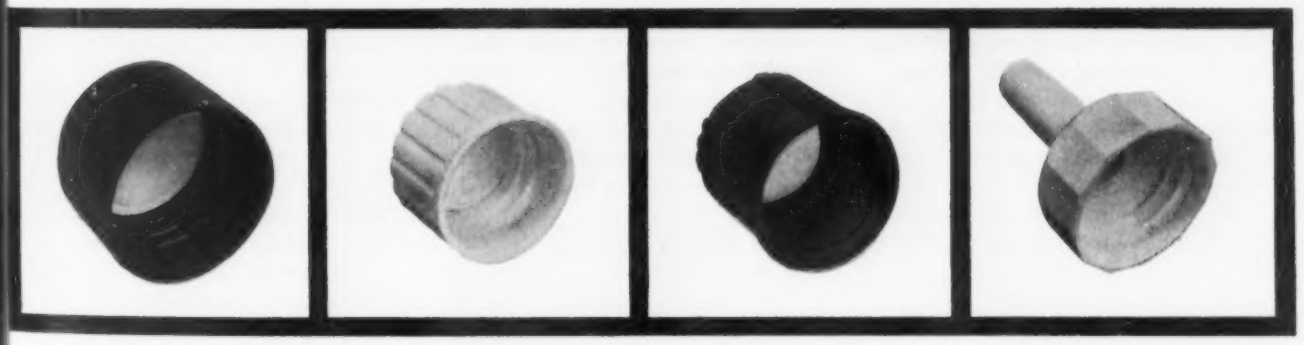
. . . because BEETLE molds so easily to any shape you wish

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Glass for household and chemical products

by A. R. KOHL*

Household and chemical products represent a large and rapidly growing market for glass containers. In 1940 total shipments of containers in this field amounted to 3,522,000 gross (507 million units). By 1954 the total had climbed to 11,131,000 gross (1.6 billion units), an increase of 216%[1]—with indications that 1955 figures would show a substantial increase over 1954.

The household and chemical field embraces a tremendous variety of products. These include household products used by the homemaker—bleach, liquid starch, liquid detergents, ammonia, bluing, room deodorants, oven cleaners and a great number of other items; products used by home gardeners, such as liquid fertilizers and sprays; the expanding "do-it-yourself" market which calls for a great variety of products and packages; chemicals in great numbers for commercial and agricultural use, and, finally, a steadily widening market for glass containers in many categories of the booming chemical field.

Considered from any angle, the prospects for effective packaging in glass appear exceedingly bright in the chemical industry. If the industry continued with products and packages that are on the market today, the population growth alone would spell increased sales.

Indications are that the chemical industry is optimistic about the population growth and is forging ahead, improving old products and developing new ones to reap the full advantage of this growing market.

All this means greater opportunities for the glass-container industry. The improved products and the new products appearing on the market require improved and new packages. And here glass containers possess an unique advantage. The chemical inertness of glass; its resistance to corrosive liquids; its convenience and visibility; its versatility—permitting it to be blown into almost any shape; and its relatively low cost, all give glass containers special attributes.

If one were asked to specify any trend in the household and chemical field, aside from the move to improve old products and to develop new ones, it would have to be in the effort to diversify product lines. This follows the thinking of many chemical packers who are looking to the future.

The reasons behind most of the diversification are logically the natural desire for protection against a decline in one line—a leveling of seasonal production slumps—a hedge against fluctuations. Other factors have to do with the changing times. There was a period when a manufacturer could start a one-line business and make it prosper for life or longer. That is not nearly so true today.

Ideas no longer carry a monopoly with them. Information gets around fast and almost overnight the manufacturer may have a dozen competitors. Technology too is changing so rapidly and new ideas are coming in so fast that what yesterday was a sure-fire product with a great future may tomorrow be just another item on the market.

Thus the maker of household products adds a new liquid detergent or a new liquid starch to diversify his line further. Or the maker of a special cleaner may develop a room deodorant or a copper or oven cleaner to provide greater variety.

Sometimes developments in one field call for the development of additional products to modify or correct certain changes that may have been brought about. For example, there are fabric softeners which may be added to the rinse water when laundering clothes.

The household-products field takes in a great variety of items used in the home. These include bleaches, liquid starch, ammonia, bluing, liquid detergents, insecticides, oil for household use, furniture and floor polishes, room deodorants, oven cleaners, adhesives, disinfectants, inks, turpentine, spot remover, liquid shoe dressing, nylon whitener, and cleaners for windows, walls, copper, silver, etc.—to mention a small proportion.

While sodium hypochlorite, generally referred to as bleach, is one of the largest general-purpose volume items used in the laundry and for disinfecting and sanitizing in the household field, other products for specific uses are beginning to show promise. Liquid starch is one of these.

Convenience outbalances price and liquid starches continue to show steady sales gains. There have been some big changes—largely postwar—in preferences among housewives. Basically, this has become increasingly evident: The U. S. housewife will pay a sizable premium for convenience.

The bulk of liquid starch is packaged in quart bottles, but the half-gallon bottle is growing in popularity. The housewife is doubly interested in convenience when it is accompanied by economy, which is one reason for

* Manager, Household and Chemical Div., Owens-Illinois Glass Co., Toledo, Ohio.
[1] Based on Dept. of Commerce figures.



Bottle for oil used in small motors has a calibrated guide so user can pour in the right amount.

PHOTOS COURTESY OWENS-ILLINOIS GLASS CO.



Visual properties of glass permit shopper to select proper kind and size. Container is prized for its reuse value in the workshop.

purchasing liquid starch in larger quantities. Many also purchase half gallons on the assumption that, if they are going to use liquid starch for general laundry purposes, they should buy it in sufficient quantity. In view of the general trend toward the "large-economy" or "king-size" package, it is possible that a number of homemakers would be interested in buying liquid starch in gallon sizes.

Liquid detergents form another group in the household-products field for which the demand is constantly increasing. In fact, the market for these items seems far from reaching the saturation point. Here too, convenience is a primary factor in its popularity with homemakers. The user merely measures out a few drops of the liquid, usually measuring by means of the cap, and adds the product to a pan of water.

Furniture polish, floor polish and liquid waxes are high-volume items for glass packaging and here again the advantages of glass—visibility, ease of opening and resealing, and versatility in design—offer special inducements to use this type of packaging.

A recent survey conducted by the Home Makers Guild of America revealed the following points:

1. Liquid polish is used by 65.6% of the respondents.
2. Liquid-type cream furniture wax is used by 44.2%.
3. Self-cleaning wax or polish is used by 81.9%.
4. In all, 92% of the respondents use liquid waxes or polishes of one kind or another.

Today's kind of living is increasing the opportunities for chemical products, which in turn is a challenge to the packager.

Houses are being built with more and more window space and this trend in turn provides additional volume for packers of window cleaners. Also, the introduction of wrap-around windshields has increased glass-cleaner usage. Here again, the element of convenience plays an important part and the window cleaner that is simply sprayed on and then wiped off with a cloth helps the user clean more windows with less effort.

Insecticides packed in glass are most commonly found in half-pint, pint and quart bottles. These are stock bottles from which the contents are poured into spray guns for use in the home. This method, incidentally, provides one of the most inexpensive and at the same time efficient means of spraying insecticides.

The present practice of many battery manufacturers of adding battery acid to batteries at delivery point, instead of at the factory, has provided a new field for glass packaging. A stock round quart is the type of container most commonly used.

Growing popularity of photography as a hobby has led to increased use of a greater number of photographic chemicals both by amateurs and professional photographers and has resulted in a vastly increased market for glass containers, since the bulk of such chemicals is packaged in glass.

Carboys have been used to transport corrosive liquids for so many years that the chemical industry has come to take them for granted. The fact should not be overlooked that acid producers would find it difficult to distribute their products in small quantities, both economically and safely, without these containers. The carboy is generally considered to include the acid bottle, the wooden box in which the bottle is packed and the cushioning material lining the box. (See "Carboys—Glass and Polyethylene," p. 650.)

The "do-it-yourself" home-repair fad which accelerated during World War II shows no sign of abatement, due partly to more leisure time and partly to a desire to economize on repairs. This activity has provided added markets for glass containers.

Such items as turpentine, household oil, adhesives (glue, mucilage, paste) and paints are common in the householder's "do-it-yourself" kit.

In addition, such items as screws, bolts, nuts and nails are now being packaged in glass jars. While the use of glass for packaging such items as screws or nails seems rather novel, the advantages of the glass packages are fairly obvious. First of all, the glass package protects the products against rust or corrosion, an important consideration for the "do-it-yourself" repairman who may use them only on occasion. Even more important is the fact that many amateur repairmen are not familiar enough with many items to call for them by number, but they can pick out the right size nail or screw by seeing it displayed in a jar. Third, the glass container is an excellent use and re-use package.

A number of assembly kits for repair and modernizing even provide extra empty glass jars to be used for storage purposes.

Home gardening also provides another big market for glass. This field includes garden sprays of all kinds and the newer concentrated liquid fertilizers. Most common sizes for these items are half pints, pints and quarts and they are usually packaged in stock round bottles.

With the mechanization in home gardening and lawn care generally, involving the use of power equipment, an interesting development is a bottle with graduations for easy addition of the required amount of lubricant. This is particularly important in 2-cycle engines where the lubricant is mixed with fuel. Engines of this type are used for outboard motors,



PHOTO COURTESY ARMSTRONG CORK CO.

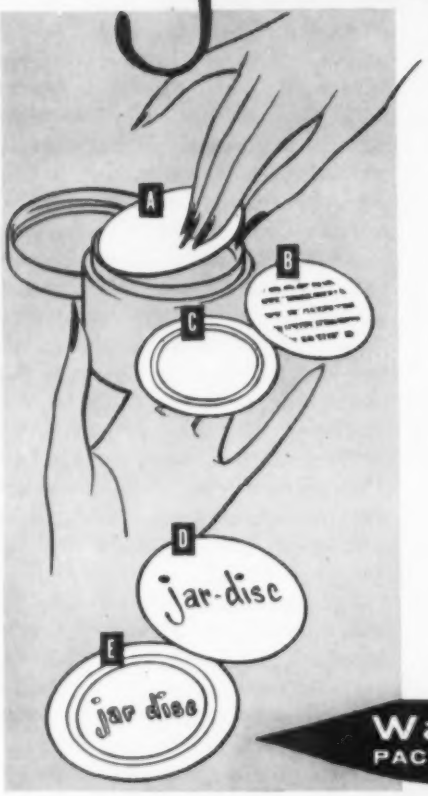
Glass bottles package many new convenience products that make housework easier.

Bottle shown here is a stock quart package with metal screw cap. This container is an old and popular standby for household products.



PHOTO COURTESY OWENS-ILLINOIS GLASS CO.

which jar-disc IS BEST FOR YOUR PRODUCT?



jar-disc PROTECTS the surface and appearance of your product — keeps the closure dry and clean.

jar-disc gives your product a PRESTIGE look, is oyster white, opaque, matte finish with sturdy .005 "body". The message on a printed jar-disc frequently eliminates a label.

jar-disc costs surprisingly little. Write for samples and quotations on your letterhead. Indicate sizes and quantities. If possible mail sample jar for exact fit.

A. FLAT STYLE for every jar size. Most sizes in stock.
B. PRINTED FLAT STYLE. Saves a direction label while it protects and beautifies.
C. FORMED STYLE. Shaped with a ridge to fit jar opening exactly.
D. HOT STAMPED. Either plain or formed, may be stamped with your logo in gold or color.
E. EMBOSSED. Either style may be embossed or debossed with your logotype.

*NOTE: Some sizes also available in molded polyethylene.

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The household and chemical industry is large and still expanding. Research will develop more and better products for better and more convenient living. Packages will be required to bring these products to market and into the home. Glass, because of its inertness, its visibility and its all-around versatility, will continue to be the favored package for many of these products.

PHOTO COURTESY OWENS-ILLINOIS GLASS CO.



Stock 6-oz. room-deodorant bottle is used with dispenser wick closure. Bottle has widespread acceptance.

PHOTO COURTESY OWENS-ILLINOIS GLASS CO.



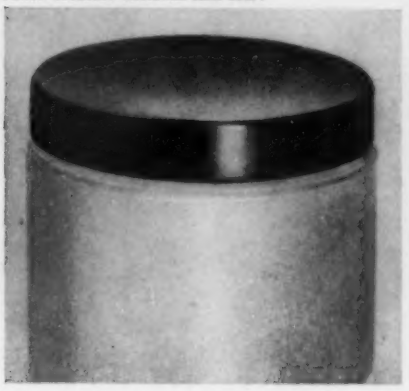
Stock mold bottles are popular for home use. They are easy to grip. Fired-on color labels stay on.

PHOTO COURTESY OWENS-ILLINOIS GLASS CO.



Coated-metal screw cap, continuous thread, flat top. One-piece knurled style. Sizes are from 18 mm. and up.

PHOTO COURTESY NATIONAL SEAL CORP.



Metal screw cap; concealed threads for small- and wide-mouth containers. Flat or domed top. From 28 to 89 mm.

PHOTO COURTESY ANCHOR HOCKING GLASS CORP.



Low-pressure venting cap for gas-forming products; flexible liner, panel indents. Sizes are 24, 28 and 38 mm.

Closures for rigid containers

The problem of container closure demands the satisfaction of two opposite conditions: One, the seal must be so positive that the contents cannot escape and outside substances cannot enter the container. Two, the user must be able to break the seal easily and often reclose the container.

The many solutions to this problem which have been devised in modern times for low-cost, mass-production containers are remarkable when you consider the variety of products packed in glass, metal, plastic and other rigid containers using closures.

Most closures today are made of metal or plastic, although cork, paper and rubber have important uses for certain products. Metals chiefly used are electrolytic tinplate or aluminum.

Amost all closures in wide use today achieve a seal by acting as one of the jaws of a vise, the other jaw being the top of the container, called the sealing surface. Between these jaws a resilient material of some kind is squeezed which actually provides the sealing surface under pressure. This is the liner of the closure. (See "Liners and Seals," p. 373.)

Types of closures

The principal types of closures[1] are (1) screw cap, (2) lug cap, (3) rolled-on, (4) crown, (5) snap-fit and press-on, (6) vacuum, (7) tamperproof or safety, (8) dispenser-applicator closures and (9) an important group of paper, cork and rubber closures that have special applications for dairy products, wines, pharmaceuticals, etc. In addition, there are several kinds of secondary or supplementary seals and closures, such as plastic shrink-on bands, foil wraps or inner seals which are used together with standard caps.

Certain types and styles of closures are traditional for various containers or products, while others are selected on the basis of ease of handling on the filling line (See "Capping and Sealing Equipment," p. 428), consumer convenience in opening and reclosing, economy or decorative appearance.

[1] Closures and applicators for collapsible tubes are discussed on p. 330.

PHOTO COURTESY ANCHOR HOCKING GLASS CORP.



Knurled metal lug cap; smaller have two lugs; larger, four or six. Eighteen sizes, 20 to 120 mm., are manufactured.

PHOTO COURTESY OWENS-ILLINOIS GLASS CO.



Flat-top jar closure with four lugs. It is available in various cosmetic sizes. (This style is the "Mercury" design.)

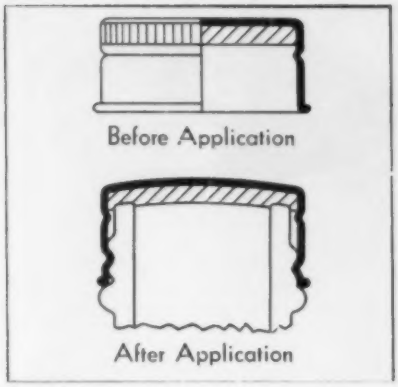
PHOTO COURTESY NATIONAL SEAL CORP.



Lug-type closure working on bayonet-lock principle. Variety of sizes, styles, colors accommodate many products.

PHOTO AND DRAWING, ALUMINUM CO. OF AMERICA





Standard rolled-on aluminum closure with knurled finish for easy grip. May be embossed, coated or lithographed in any color or design. Used for foods, beverages, pharmaceuticals and chemicals. Sizes range from 18 up to 38 mm.

PHOTO COURTESY HAZEL-ATLAS GLASS CO.



Easy-opening vacuum-lug screw cap combines with easy-stacking feature.

The wide variety of closures in current use indicates that the packager can emphasize any of these requirements and still be assured of a closure that will fulfill its primary objective, which is, of course, protection.

Screw cap. The most important idea to emerge from early developments in metal closures was the screw cap, still a leader and supplied in various metals and plastics. The threads of the screw cap engage with corresponding threads molded on the neck of the container. This style has survived because of the basic soundness of its principle, which offers a mechanically simple means of generating enough force to provide safe sealings and repeated resealings.

All kind of liquids, viscous products and creams or pastes that can be packaged in bottles or jars are seen using this type of closure, particularly foods and household or industrial preparations that are packaged in put-ups of quart size or less.

Lug cap. Near relative of the screw cap is the lug cap, which operates on much the same idea. The lug is slid under a projection on the neck of the container. As it is forced home, it obtains leverage for a direct downward pull against the liner.

Lug caps are suitable for use on most products that are packaged in glass containers. The container finish is designed to accommodate the lug construction. Recently, lug-type, screw-off metal vacuum caps have been adopted by leading packers. Newly developed equipment makes it practical to apply these caps at high speed. The caps excel in ease of opening and reclosing.[2]

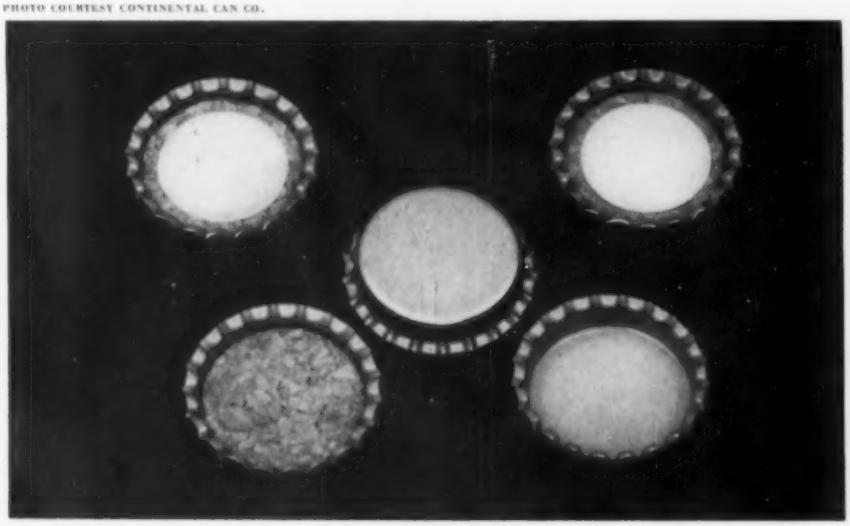
Rolled-on cap. The rolled-on closure (a patented device) differs from screw or lug styles in that it is supplied to the packer as a blank shell, usually of aluminum. The shells are rolled against the threads of the container neck under pressure in the closure operation. The threads of the individual container tailors the thread of the particular closure to a perfect fit or more effective seal.

A number of variations have been devised for the metal cap to conceal the outline of the thread or lug so that the outer surfaces of the closure will present clean, unbroken lines.

Crown cap. Another important type of closure is the anchored closure,

[2] See "Does She Really Care?" MODERN PACKAGING, June, 1955, p. 95.

PHOTO COURTESY CONTINENTAL CAN CO.



Crown caps are widely used on beverage bottles. Front right shows underside of unlined crown; left, with cork disk; center, topside view; back left, aluminum foil spot used for beer; right, vinylite used for carbonated beverages.

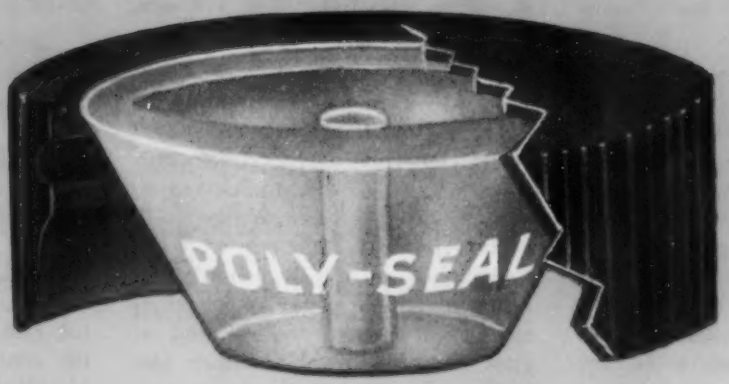
PHOTO COURTESY CROWN CORK SPECIALTY CORP.



Metal lock-on cap with lever opening device uses cork, coated paper, composition gasket or foil as liner material.

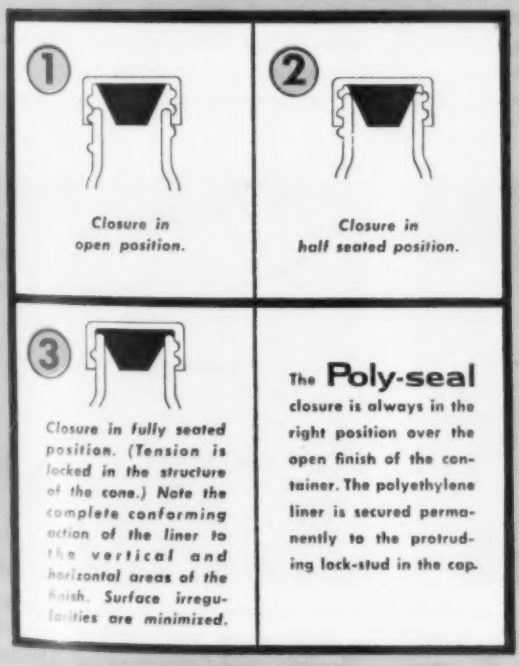
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PHOTO COURTESY SWAN METAL CAP CO., INC.



Friction-fit cap for straight-side-finish re-use tumbler. This type of cap is suitable for sealing cold-pack foods.

PHOTO COURTESY STERLING SEAL CO., INC.



Snap-on cap for glass tumblers may be decorated or embossed. Available in various sizes from 53 to 170 mm.

PHOTO COURTESY UPRESSIT PRODUCTS CORP.



Reseal caps with tamperproof band automatically or manually applied on metal or glass; 26- to 107-mm. range.

such as the familiar crown cap for bottles. Flutes are pressed into the flaring skirt of a shallow metal disk, which holds an inner coin of resilient lining material that forms the actual seal. In capping, the flutes are forced against a projecting ring on the container finish, giving maximum friction for the strong grip needed in sealing carbonated beverages, where pressure inside the bottle is considerable. Yet the crown cap may be removed by a simple prying motion because of the inherent outward flexibility of the flared cap skirt and the smoothness of the projecting ring on the bottle neck.

Lock-type crown. Where frequent resealing is required of a crown closure, a spring lever is sometimes incorporated which, when flipped up, releases the crown in perfect shape for efficient reclosing. It finds excellent use on cans of turnpentine, oil, syrup and similar products, and also, to a lesser degree, on bottles.

Snap-fit or press-on-cap. Some very effective closures are in reality little more than metal lids with some simple method of hooking to the glass finish like a ring of indented beads along the side or a continuous indentation which snaps under certain portions of the glass finish. In other cases, only the friction between the inside of the cap skirt and the outside of the container finish holds the cap in place. Friction snap-ons come in polyethylene as well as metal and are used on glass, plastic or metal containers like toothpowder cans.

Slip-on or snap-on caps are frequently found on re-use tumblers, where the even finish of the glass rim is part of its attractiveness. Jellies and cocktail nuts are sometimes packaged using this type of closure.

Vacuum cap. The nonscrew vacuum cap has made important strides volumewise in the past few years. Sealing leverage develops from atmospheric pressure obtained against the package when air is withdrawn from the container either in processing the product or by mechanical means. This type of closure operation is ideally adapted to the needs of the food-processing and packing industry.

Sometimes further security for this type of seal is given by holding the cap to the finish with a fixed lock, the edge of the cap being forced under a projection of the glass finish during capping or held under a similar projection by snap lugs. In most vacuum caps, however, the friction of a rubber gasket against the side or top of the container finish effects the seal. In still other cases, atmospheric pressure alone is adequate for sealing.

In addition to the protection given perishable products, vacuum closures are popular because of their extremely high application speeds in straight-line capping operations. The capping motion required is a straight thrust rather than the more time-consuming twist required in screw- or lug-capping operations.

The resealing disadvantages which plagued the early vacuum caps have been largely overcome by better designs and greater consumer experience in opening and reclosing them.

Safety closures. There are several

PHOTO COURTESY ANCHOR HOCKING GLASS CORP.



Metal pry-off cap for vacuum sealing, sterilizing or processing. Is made in 11 sizes, ranging from 27 to 83 mm.

PHOTO COURTESY THE WHITE CAP CO.



Vapor-vacuum wide slip-on closure. Common range of stock sizes available varies from 55 mm. to 80 mm.

PHOTO COURTESY THE WHITE CAP CO.



Vapor-vacuum narrow slip-on closure is available in stock sizes from 27 to 38 mm.; used for sauces and ketchup.

PHOTO COURTESY THE WEST CO., INC.



Closures of specially formulated rubber compositions assure necessary sterility for biological and other ethical pharmaceutical products. Special attention is paid to compatibility of stopper material and products.

PHOTO COURTESY ALUMINUM CO. OF AMERICA



Long-flange pilferproof roll-on closure is leakproof, may be side embossed.



Secondary closures of tight-fitting foil add tamperproof insurance heightened by a neat, eye-appealing touch.

different types of safety closures designed to guard against tampering. In one type, both container finish and cap skirt are extra deep. The bottom of the outer cap shell is curled under a protruding ledge on the neck finish, giving a tight grip which resists any attempt to unscrew it without tearing along a break line perforated in the cap above the skirt rim. When twisted, the cap comes off in the hand, leaving a portion of its skirt on the bottle to show that it has been opened. The top portion of the cap is generally threaded for resealing.

One variation has a special metal collar attached over the closure. Once the collar is opened, it cannot be reclosed. The cap can be put back on, but the tell-tale metal band left on the bottle finish shows that part of the original closure is missing.

Single-piece metal safety closures are made like a shallow roll-on cap but with an opening cut into the center of the dome. When pulled, the cap comes off easily except that it tears. An inner closure, often a cork plug, thereafter serves to protect the remainder of the contents.

Safety closures are found on bottled liquor, food products, drugs and chemicals.

Similar protection and smart pack

PHOTO COURTESY GUARDIAN SAFETY SEAL CO.



Aluminum tamperproof closure made for liquor bottles. Size shown is 30 mm. and it has a special neck finish.

PHOTO COURTESY OWENS-ILLINOIS GLASS CO.



Molded plastic screw-type jar cap with a short skirt in plain design. Fifteen sizes available from 15 to 89 mm.

PHOTO COURTESY ARMSTRONG CORK CO.



High-torque molded plastic bottle closures with recessed, attractive, handy grip for protection against breakage.

PHOTO COURTESY TUPPER CORP.



Polyethylene closure has over-lock feature giving tight seal. The cross-sectional cut-away shows construction.



PHOTO COURTESY THE POLY-SEAL CORP.

Polystyrene caps with cone-shaped polyethylene liners are designed for chemical products. Liner eliminates back-off, binding, leakage. Polyethylene dropper locks in place as cap is tightened.



PHOTO COURTESY W. BRAUN CO.

Specialty decorative closures of molded plastic both close the container and add eye-catching appeal. Many different stock styles, sizes and colors are manufactured.

aging appearance are provided by several types of supplementary closures available. One type is the paper disk or diaphragm that is sealed over the neck opening of the bottle to help protect the contents and assure the purity of the contents. The aperture seal is popularly used on containers for food products like soluble coffee and on pharmaceutical items.

Another type of secondary seal is the outer foil wrap, frequently employed on beverage bottles. The shrink-on band is another secondary closure whose use is steadily increasing both for protection and decoration. (See "Cellulose Seals," p. 376.)

Plastic closures

Plastic closures generally fall into two categories based on the materials from which they are made—thermosetting resins and thermoplastic resins. Principal thermosetting resins are phenol formaldehyde and urea formaldehyde, which have many characteristics in common. They offer a finished part which is light in weight, resistant to alcohol and has good surface appearance. Leading thermoplastics used for closures include polyethylene, vinyl and polystyrene.

Choice of liner materials will depend on the products being packaged (See "Liners and Seals," p. 373). Generally, however, the liner backing is of cork, wood pulp or newsboard bonded to a facing of film, paper or foil. Polyethylene closures generally do not require a liner.

The thermosetting compounds can be molded into standard shapes for standard containers—chiefly glass bottles packaging all kinds of liquids, whether food products, medicines, household preparations or toiletries, and opal glass or plastic jars packaging salves, ointments and creams in the drug and cosmetic lines. These closures are almost entirely of the deep- or shallow-skirted screw-cap types and are used instead of metal closures for decorative purposes.

Special effects, both in shape and color, can be gained by private-mold or special-order manufacture. Caps designed to simulate flames, flowers, plumes, boots and hats, as well as abstract shapes are made to order for special package treatments.

Plastic caps can also be plated for metallic effects. Among recent developments of this kind, one plastic compound has an inherent sparkle created by the composition of the material itself. The effect is quite eye catching.

Many types of dispenser-applicator

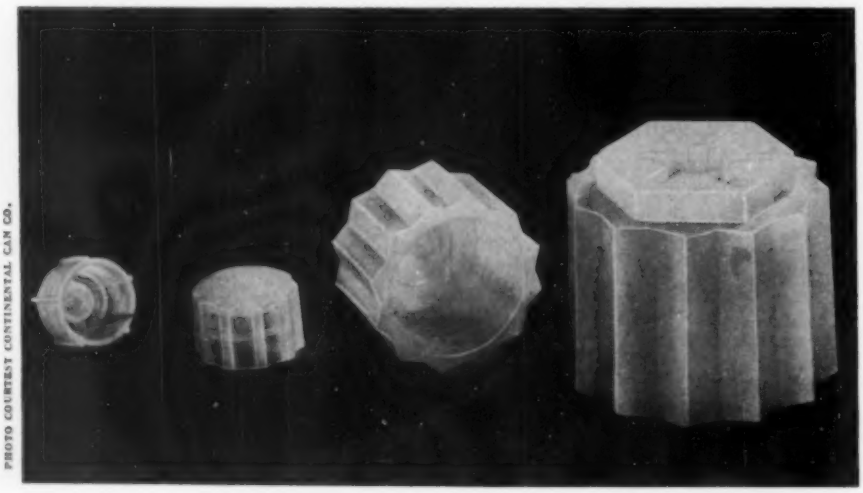
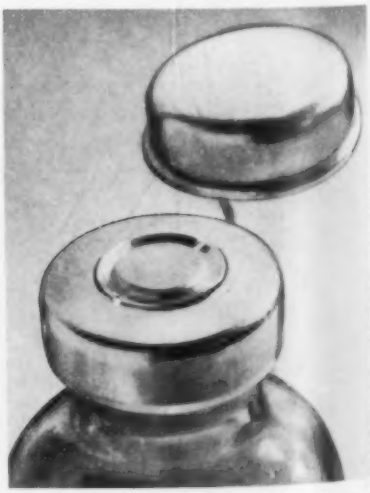


PHOTO COURTESY CONTINENTAL CAN CO.

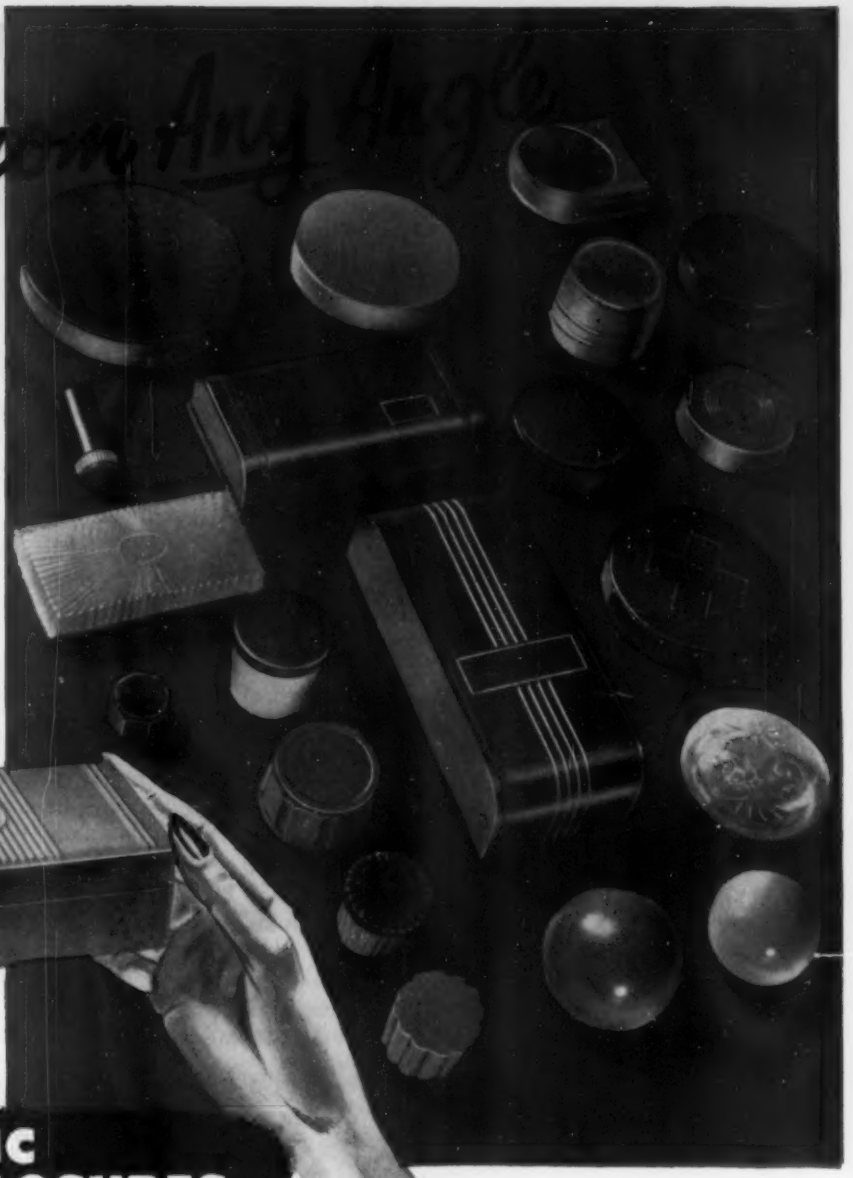
Polyethylene molded closures: three to left conform to GCMI standards, may be used on any containers with these neck finishes; right—closure with modified A.S.T. 29-deg. stub thread used on 1-gal. bottle for corrosive acids.



Tamperproof aluminum closure insuring sterility is available in 11-, 13-, 20- and 30-mm. sizes.

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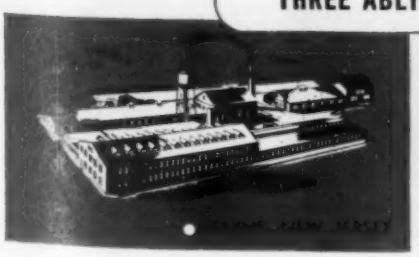
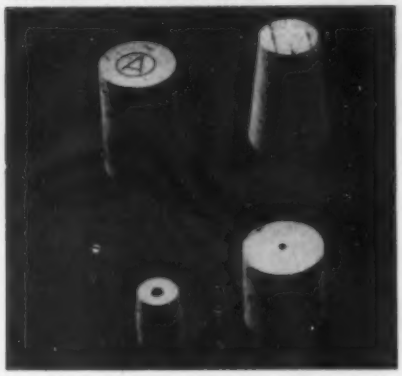






PHOTO COURTESY ARMSTRONG CORK CO.



Representative corks, including two with reducer holes, that take a variety of specialty dispensing devices

PHOTO COURTESY MUNDET CORK CORP.



Flange cork with trademark embossed top gives distinctive identification; permits easy opening and reclosure.

closures service various specialty markets. There are special dispensing closures for seasoning salts and other powders, with a whole line of combination closures and droppers or stopper rods for such drug products as ear, eye and nose drops and iodine. (See "Opening and Dispensing Devices, p. 380.)

Polyethylene because of its many advantageous properties is one of the most versatile materials for re-use, dispenser and other specialty-type closures. Judging from advances already made, the field is practically unlimited. Screw, snap-on and plug caps are the popular types, but there are many variations, including captive or hinged-on caps and novelty designs. In addition, special spout and nozzle constructions can be found in both consumer and industrial fields.

The polyethylene snap-on caps lend themselves especially well to application on jars, tumblers, refrigerator dishes and juice shakers, where their re-use value adds greatly to their appeal. For this reason, polyethylene closures are a natural for certain food packages. On the other hand, they are equally efficient as closures for pharmaceutical packages and are, for example, widely used on vials. Polyethylene closures are also strong in appeal where novelty or attractiveness may be desired, which accounts for their popularity on packages for toiletries and similar items.

Industrial applications are important, too. Jumbo-size polyethylene threaded caps are available in a range of sizes for use on the larger polyethylene bottles. Reversible spout-type closures are being used on drums, pails and polyethylene carboys.

Parenteral closures. Closures for bottles, vials or cartridges packaging parenteral (continuously sealed and sterile) products for the drug industry are used in great number. The developments in antibiotic therapy and its widespread use have increased demand enormously. Special problems, however, are encountered by the makers of these closures.

Sometimes they must provide sterility for the product even after the container has been entered several times for withdrawal of single dosages. Closures must in all cases be dimensionally uniform and stable in composition, must be designed for ease of application on the packaging line. Migration of particles from the stopper to package contents, leaching of stopper materials by aqueous solutions represent difficulties to be avoided in the interest of product protection and sterility. Treated rubber compositions are used for closures of this kind, because few materials have been found to compete with natural rubber.

Cork closures have a place in packaging, particularly in glass and ceramics. Often cork is used in combination with some other material. For example, the cork stopper used in the pottery package for an imported mustard paste is sealed into place by sealing wax; the cork stopper appearing on a famous rum bottle is capped by a wooden top faced with an embossed coating that bears the trademark of the distiller. Other cork closures used in perfume and food-extract packaging act as a sort of washer around a glass stopper and supply the resiliency to the stopper sides needed to effect proper seal.

Paper closures. A whole industry is serviced with remarkable completeness by waxed and unwaxed paper closures—the dairy industry. Glass milk and cream containers and containers in both glass and liquid-holding paper for various other dairy products like cottage cheese, sour cream and whipped butter are big users of various styles of the paper closure. In addition to the standard crimp-edge cap which covers the container lip, other styles are in use like the flat-disk tab opener which lifts out of the bottle mouth. Sometimes these disks are covered by a pleated outer cover which is secured over the bottle lip by a twisted wire.

PHOTO COURTESY FERDINAND GUTMANN & CO.



Secondary closures of paper prevent tampering and keep the contents fresh.

PHOTO COURTESY SEALRIGHT CO., INC.



Outer hoods offer double protection against contamination. Fold-over flaps shape neatly over bottle neck. Types are available for glass and paper bottles.

Liners and seals

by TRACY COWEN*

Of all the specifications for closures which must be known to the packager and the closure supplier, the liner specifications are among those most often neglected. Yet without a liner fitted to the needs of the product and the container, the entire package may fail at some point in the period between packaging for shipment and use of the product, with resultant loss to the product manufacturer—whether in terms of damage cost or, what is even worse, the loss of consumer good will.

For the greatest number of uses, the container liner comes in two parts: the backing, which serves as a resilient cushion to absorb the sealing pressure and hug the container finish; and the facing, which resists penetration by product vapor, fluid or solid.

The backing is a disk of either some heavy paper like newsboard, pulpboard or paper felt, or bonded granules of cork (called compo cork). The facing may be a very thin metallic foil of tin, aluminum or lead but more often is a thin paper coated or impregnated—sometimes both—with some material resistant to product action.

Metallic foil facings

Tin foil may be used for sealing products like hydrogen peroxide, grain alcohol, drug and flavoring extracts and oils, organic solvents, nail polish and remover, liniments and many other medicinals. Tin foil facings are ideal in the packaging of medicinals, pharmaceuticals and biologicals containing highly volatile chemicals, or preparations containing an equivalent alcohol content in excess of 50%, which products cannot be satisfactorily sealed otherwise.

Aluminum foil is used in reasonably large quantities as a spot material with gutta-percha backing in metal crowns for sealing beer containers and the like. When duplexed to a suitable backing it also is used in regular continuous-thread or threaded molded caps for sealing nonalkaline products not too volatile in nature but containing ingredients that readily affect ordinary varnish, synthetic resin and wax coatings. In most cases calling for aluminum foil in the liner, it is desirable to use a composition cork backing because this type of foil has an inherently hard surface and a resilient cork backing permits better conformity to the glass container.

Lead foil (chemically pure) has been used for sealing products such as concentrated sulphuric acids, radiator compounds, leather dressings, automobile polishes, petroleum hydrocarbons and aromatic solvents, radiator antifreeze and insecticides. Lead foil under no circumstances should be used for packaging food or other products that might come in contact with human or animal skin.

Lead foil (composition) is used in closures for sealing products like automobile polishes, petroleum and coal-tar solvents, certain cleaning compounds, radiator antifreeze and furniture polish.

Laminated Pliofilm is one of the most versatile liner materials. It is made by laminating a transparent sheet of rubber hydrochloride film (Pliofilm) 0.0012 in. in thickness to paper with a thermoplastic adhesive. It is used in large quantities for sealing containers of many alcoholic beverages such as whisky, wines and gin, chlorinated washing fluids, mineral waters, drugs and pharmaceuticals. Being a rubber derivative with thermoplastic properties, it is not recommended for sealing oils or oily products, or for hot-packed products.

It does excel, however, in the protection it gives to many products because of its low water-vapor permeability factor, its excellent conformity to glass finishes and the easy removal of the closure it makes possible.

Laminated cellophane is made by combining both moistureproof and nonmoistureproof transparent cellophane or regenerated cellulose to paper.

It is recommended for use on mineral, vegetable and fish oils and even for certain essential oils. It is suitable

PHOTO COURTESY CROWN CORK & SEAL CO., INC.



Vacuum is checked on finished jar of pickles sealed with rubber ring closure and lug cap. Cooperative work on problems of this nature aids packer in maintaining product uniformity and customer good will.

* Assistant General Manager, Standard Insulation Co., E. Rutherford, N. J.



Tests such as this one show the relative effectiveness of different cap liners in preventing water-vapor loss during long-term storage under identical conditions. Contents level of bottles shows results after 2½ years.

for sealing containers for most organic solvents; it is unsuitable for any product containing water.

Laminated saran is made by combining 75- or 100-gauge extruded polyvinylidene-chloride transparent film (saran) to paper with a thermoplastic adhesive. This combination of materials has produced the most resistant liner material yet developed by the closure industry. The following properties predominate in this unique facing: (1) high gloss and a very attractive appearance; (2) excellent toughness, flexibility and tensile strength; (3) strong bond between film and paper; (4) outstanding chemical resistance; (5) minimum odor and taste; (6) low water-vapor permeability to assure good sealing.

Laminated saran film is resistant to weak sodium-hydroxide solutions, 50% acetic acid, 50% grain alcohol, 10% salt solution, corn oil and other chemicals. It has been found very satisfactory for sealing such products as perfumes, face creams, lotions, deodorants, hydrogen peroxide, shampoos, radiator compounds, dentifrices, and many drugs and chemicals.

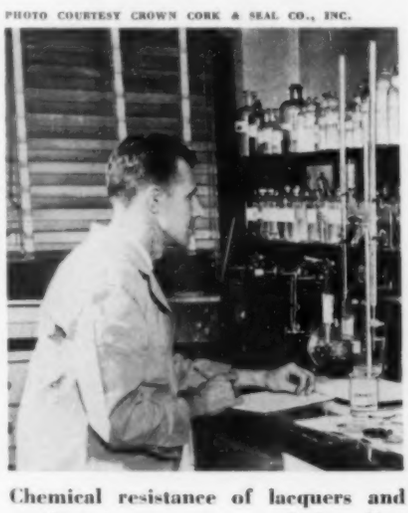
Liner constructions have been simplified and improved because of improvements made in the base film in addition to improved laminants and laminating techniques. By laminating a film of saran directly to white-lined pulpboard and kraft or yellow-dyed newsboard, a considerable saving in cost has resulted.

Varnish- and resin-coated paper. In this classification we find by far the greatest demand for the varnished paper types. This liner material is produced in very large quantities by applying resistant oleoresinous baking varnishes to pure and bleached kraft paper and paper having kraft and soda pulp fibres. It results in a fine-appearing liner having high gloss, good flexibility and one with adequate resistance to water, brine solutions, vegetable oils and similar products requiring a resistant surface.

Because of these properties and the relatively low cost of this liner, it has found virtually universal acceptance in the food-packing industry. It is successfully used for packaging peanut butter, olives, cheeses, jellies, maraschino cherries and also all types of pickles, pickled onions, vinegar, mustard, relishes, and sauces and other condiments.

When an added wax coating is applied, the varnished paper liner with a suitable backing is adequate for packaging such delicate products as mayonnaise and salad dressings which, due to their vegetable-oil content, are subject to oxidation causing rancidity and product spoilage. Varnished paper with the added wax coating, when used in closures for sealing hygroscopic products such as soluble coffee and malted milk, keeps air and moisture out of the package—hence, prevents the product from caking or losing its flavor.

PHOTO COURTESY CROWN CORK & SEAL CO., INC.



Chemical resistance of lacquers and coatings is one measure of the effectiveness of the sealing job they do.

Generally speaking, varnished paper liners have adequate resistance to water and water vapor and permit sufficiently low losses by evaporation to retain the freshness of most foods.

So-called black alkali-resisting paper has been used in the closure trade for many years. It is quite similar to the regular varnished papers with the exception of its color, which is, of course, black. The color is due to the presence of asphalt or gilsonite or both. This liner has good resistance to weak alkaline products like milk of magnesia, hair shampoos, shaving creams, and many other drugs and pharmaceuticals. With the development of the newer, more chemically resistant synthetic facings, demand for black alkali facing has lessened.

Synthetic-coated paper facings

The principal facing used in the trade is composed of urea-formaldehyde-melamine resin applied as a baking varnish to pure or bleached kraft paper. Its principal properties are solvent and oil resistance, and it is used as a substitute for tin foil and aluminum foil on products where a white liner is desired and a saving in liner cost is one of the predominant requirements.

Although this facing has ample water resistance, its make-up is such that it doesn't permit adequate conformity to glass finishes. Relatively high evaporation losses can therefore be expected on certain aqueous products. These losses particularly evidence themselves in jars or bottles of small volume having a relatively large-diameter opening.

Saran-coated paper, in which the saran resin is applied from a solvent solution, has been used with considerable success for several years, particularly on volatile products like antiperspirants. It has a very low water-vapor transmission rate.

Other facing formulations

Dark brown acid-resisting paper. This is composed of regular kraft paper coated with an oleoresinous varnish which has more or less a mahogany color secured by either tinting the varnish or modifying it with another varnish containing gilsonite or asphalt base. This material has been used in considerable quantities for sealing products where a slightly bet-

ter resistance to an alkali is required.

Dark brown acid-resisting paper casein coated. Basically, this liner facing is the same as the one just described to which a casein coating has been added for organic-solvent and oil resistance.

Casein-coated tin foil. This liner facing is used where greater sealing efficiency is required than plain tin foil can provide. It has been used in the packaging of products like mineral oil, vegetable oil, cod liver oil and various organic solvents. Although straight tin foil may be adequate, the theory of the casein coating is that it conforms a little better to glass–thus tending to minimize further evaporation, while preventing product leakage.

Waxed composition cork. This material is used in packaging products where the high sealing efficiency of cork is required and where the container contents are of a very mild nature and will not attack the wax.

Waxed facings. It has been determined by experience that a wax coating applied to a liner facing such as varnished paper, saran or rubber-hydrochloride film greatly enhances its sealing efficiency. This particular wax coating normally measures 0.001 to 0.002 in. in thickness and obviously must be resistant to the product on which it is to be used. The function of this added wax coating is to aid the sealing properties of the liner by conforming to the glass jar finish, which greatly reduces entry of air.

Calendered coatings

Paper calendered and coated with vinyl chloride acetate has made a great contribution to the closure industry. It has been used quite universally for many years, with outstanding success in the drug and pharmaceutical industry. It is made by calendering white sulphite paper with a plasticized mixture of vinyl chloride-vinyl acetate resin copolymer having a thickness of approximately 0.002 in. It has excellent chemical resistance to weak acids and alkalies and many other chemical solutions. It has a very attractive appearance, is comparatively low in cost, but has a rather high water-vapor permeability rate.

Calendered polyethylene is made by the same process used in producing calendered vinyl chloride acetate. Up to now, use of calendered polyethylene has been limited to molded closures for sealing chemicals, pharmaceuticals and some cosmetics. However, its popularity is expected to increase rapidly because of its high chemical resistance and low water-vapor transmission rate.

Wax coatings

Last, but by no means least, are liners the base coating of which is composed of refined paraffin wax, microcrystalline wax, ceresine wax or a formulation from all three types.

Refined paraffin wax liners have been used for a good many years for sealing containers of hard candy, pills and tablets, dry drugs and pharmaceuticals, soluble coffee and other hygroscopic food powders, mild face creams and cosmetics. This liner is not recommended for products containing mineral, vegetable, fish or essential oils, nor is it recommended for a product containing solvents of any nature which might affect wax.

Plastic wax coatings. Liners made under this designation are finding greater uses from month to month. They are now being supplied to many food packers for the packaging of olives, pickles, mustard, marinated herring and allied products. This liner gives excellent protection to such products. Since the pulpboard backing is wax saturated, it is unaffected by liquid overflow from the product and is not subject to swelling or mold growth should the product penetrate the liner.

Waxed pulpboard. This liner is made by coating pulpboard with paraffin wax or a combination of paraffin and ceresine wax.

A wax coating by nature is not continuous and is always subject to liquid penetration. Waxed pulpboard is, however, an excellent liner backing where extra protection is needed.

PHOTO COURTESY CROWN CORK & SEAL CO., INC.



Shelf life of cap liners is being tested for uniformity of performance and product resistance.

Liner backings

Pulpboard and newsboard are the most popular backings and are used in the largest quantities in the closure trade. They are adequate for use in the sealing of most food products when duplexed to the proper facing material. In the food-packaging industry, where price is a factor, these backings are used for economy.

Composition cork is conceded to be the most efficient liner backing because of its ability to compress readily at normal cap-sealing pressures and return to its original position. On the other hand, it has been found that composition cork must be backed with paper in order to reduce its tendency to curl, which sometimes causes the liner to fall out of the cap. Cork backing with the proper facing material is recommended for sealing certain liquors, perfumes, volatile solvents, essential oils and the like.

Gray felt and white felt. These backing materials are used in fairly good quantities as liners in the closures for those products where pulpboard and newsboard have been found to be too hard and where the excellent sealing efficiency of composition cork is not required. Liners backed with white or gray felt have been found quite effective in molded closures having a relatively thin construction and subject to breakage when applying caps to bottles. By using a felt backing, greater compression into the liner is made by the glass finish at low sealing pressures. Felt backings have been found adequate for many volatile products.

Gaskets

The increasingly broad mass-production field of vacuum packaging and hot processing of foods calls for a screw-cap, press-on or lug-type closure and a washer or gasket of rubbery material. One recent development from Australia achieves a continuous top, corner and side seal using a cap of fairly shallow design admirably suited to re-use needs.

Flat rubber rings are used for liners on vacuum products or products filled hot or hot processed after filling. Pour-in composition gaskets of natural or synthetic rubber or some compound of both are supplied in a water emulsion or dispersion.

Cellulose seals

by LOUIS J. TRECEK*

Packaging progress and product protection have gone hand in hand since olives came out of the unsanitary and uneconomical open barrel to go to market in glass jars. Many products found their way into glass jars. Consumers liked the easy-on, easy-off screw tops and corks. However, losses continued, because everything from sniffing to tasting, from contamination of the contents to actual substitution still went on. The packages were too easy to open.

The development of cellulose seals —sealing the cap to the bottle neck— offered safeguards to both the packager and the consumer. The cellulose seal prevents the cap from being unscrewed or opened while packages are in transit or on dealers' shelves. This is tremendously important, today, when so much merchandise is sold in self-service-type stores. This type of retailing has led to cap switching. Here a shopper switches a cap that has a low price stamp onto a product of higher price. The cap-switched package that goes back onto the shelf is prey to oxidation and spoilage. Other shoppers will taste a product when no one is looking. If the package is returned to the shelf, again there's the possibility of spoilage. The shopper who may eventually purchase the packages that have been tampered with may never know why the product has a slight off-flavor. But she'll switch to another brand next time she has occasion to buy that product.

* The Celon Co., Madison, Wis.

Safeguards set up by the cellulose seal are, therefore, important. You find them in widespread use for such diverse products as pharmaceuticals, wine and liquor, foods, cosmetics and many others. Container types sealed with cellulose seals include glass bottles and jars, aerosols and re-use containers like plastic squeeze bottles. Cellulose bands are also used to bond premium offers, affix special attachments to a package or provide protective coverings over delicate mechanisms, and to prevent dust and dirt from abrading tools, airplane parts, etc. in shipment and storage.

Cellulose seals are shipped and kept in solution until placed on the package. Applied while still wet, they shrink as they dry. This controlled shrinkage provides a very snug, tight seal, fitting the exact contours of the bottle neck and cap. The seals cover the open flange of the cap, sealing the cap firmly to bottle necks. Ample protection is provided against such hazards as: tampering, pilferage, odor absorption, substitution, sifting of dry products, insect infestation, dust and dirt seepage, flavor loss, aroma loss and evaporation.

In a host of different fields consumers have come to expect the manufacturer to provide them with a package protecting the product against these hazards. The use of cellulose seals for such protection is widespread. Moreover, many astute merchandisers get double value by incorporating decorations in the seals. Long strides forward have been made in converting what originally was primarily a protective device to a means of adding the highly important advantages of greater beauty and more sales power to the package. Five categories of eye-catching design subjects are most frequently used—sometimes several in combination: trademarks, slogans, a sales point, brand names and guarantee.

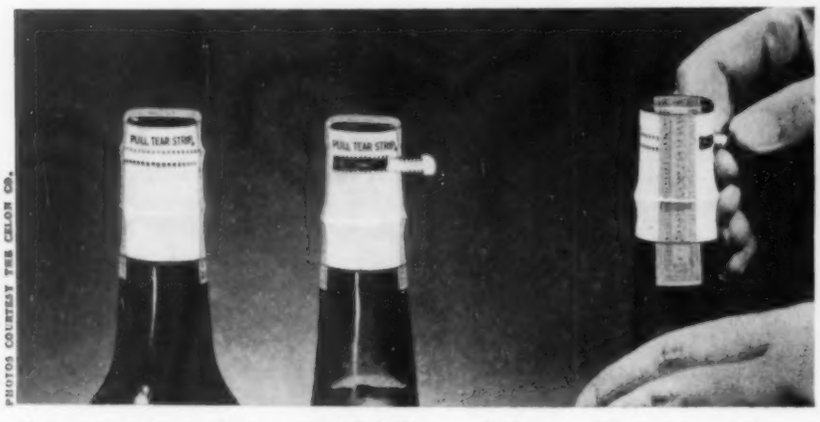
The trademark design. At the top of the bottle where it can be seen without difficulty, is the ideal spot to play up a big trademark, for "family" identification, for strong product identification. Even when bottles are stacked one behind another on dealers' shelves and bottle labels are hidden, the cellulose seal can be seen and the package identified.

The slogan decoration. This type of decoration will help tie in your package with advertising campaigns.

The sales-point design. Seals offer a logical area for special copy themes that highlight sales points which should not be "buried" among the mass of necessary type and information on the label. On wines and liquors, vintage years or bottled-in-bond sales copy is often used. Tie-in uses illustrated on the band are also effective sales boosters.

Brand-name decoration. The brand name isolated by itself on a cellulose seal often carries farther and has more impact than on the bottle label. Trademarks and slogans are often combined with brand names for a three-way display.

Guarantee. Where it is particularly important that the consumer have



PHOTOS COURTESY THE CELON CO.

New convenience feature provided by a cellulose seal is a tear strip. Seal is as tamperproof as ever, but is now easy to remove.

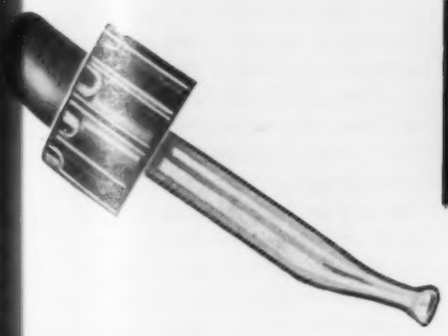


Cellulose seal applied over crown closure helps keep mouth of bottle clean.

New Perfection

DROPPING PARTS

"Repeat-Sale Insurance" for Liquid Preparations



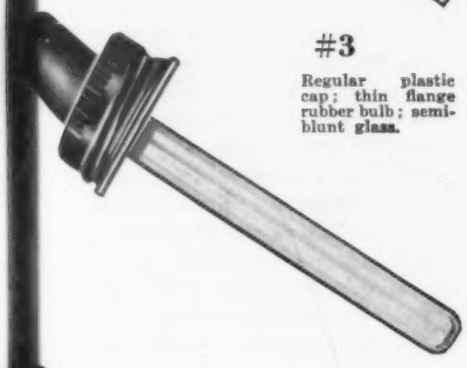
#1

Non-rolling, extra-depth Bakelite cap; thick flange rubber bulb; Saftee-ball glass.



#3

Regular plastic cap; thin flange rubber bulb; semi-blunt glass.



#4

Metal cap; oil-resisting Amekine synthetic rubber bulb; blunt glass.

5

ll size plastic
midget rub-
bulb; regular
ght glass.

The New Perfection line of functionally designed dropping parts gives satisfaction where satisfaction counts—in the hands of the user. To make sure the customer's first reaction to your product is 100% favorable, specify New Perfection. Our rigid inspection system assures the cleanliness and uniform high quality of every shipment.

New Perfection dropping parts will fit your bottle or can be furnished in combination with our Modernistic bottles in Amber, Blue, Green or Clear glass. Bottle sizes—⅛, ¼, ½, 1 and 2 oz.

NEW PERFECTION DROPPER GLASSES

CALIBRATED

IN COLOR

This inexpensive extra adds welcome convenience to the use of your product. Accurate calibration in any color marks the specific dosage indicated. Your firm name or trade-mark may also be imprinted.



#2

Non-rolling, extra-depth Bakelite cap; thick flange rubber bulb; special bent glass (CALIBRATED IN COLOR).



Improved bottle shape. Designed to lie flat for convenient labeling. Front provides ample label space.

IN ADDITION to NATURAL RUBBER BULBS for GENERAL USES, WE CAN ALSO SUPPLY

AMEKINE (OIL-RESISTING) Synthetic Rubber Bulbs

which are recommended for use with oil preparations, such as nose and ear drops and vitamin products. Even after long exposure to oil, Amekine closely retains its original shape and functions perfectly.

PENNSYLVANIA
GLASS PRODUCTS CO. INC.

"Glass Goods of the Better Kind"

430 N. CRAIG ST. • PITTSBURGH (13), PA., U.S.A.



PHOTO COURTESY DU PONT

Cellulose bands have paid their own way with merchandising and protective extras to warrant their widespread adoption by many products starting with liquors and progressing to many other items.

called to his attention the fact that the cellulose-sealed package offers him special advantages, such copy as this can be featured on the cellulose seal: "This unbroken seal is your guarantee of quality" . . . or, a precautionary—"Do not accept if this seal is broken," etc.

The back of the cellulose seal often carries a longer message. It can incorporate special directions for product use; text selling extra, more unusual ideas for product use; copy encouraging more frequent use of the product; or longer sales copy featuring the virtues of new or other products made by the same packager.

The cellulose bands can be used as an over-all label, or to hold an over-all wrapper to a bottle. The bands will affix a tag, small folder, charm, ribbon or other special merchandising gadget to the bottle. The seal, dropped over the cord holding the gadget, holds this cord very firmly to the bottle neck when the seal has shrunk dry.

Materials

The basic ingredient in a cellulose seal is high-grade wood pulp. The pure pulp, in the form of white sheets, is converted by chemical treatment into a sirupy amber liquid known as viscose. Two of the chemicals which largely contribute to the conversion of the wood pulp to viscose are caustic soda and carbon bisulphide. Other chemicals used include sulphuric acid, hydrochloric acid, bleach, dyes, pigments, plasticizers and water. Mechanical aids and controls are important factors in the manufacturing process, which is also dependent upon very close temperature control.

Colors, finishes, types. A wide variety of colors is available. Pigments range from white to black and by blending of primary colors almost any tone wanted can be obtained. Pigments are added to the highly alkaline viscose just before extrusion into the tube shape. Because of its extreme alkalinity and, later, the application of other chemicals of high concentration, slight variations can be expected in repeated runs. However, the variations are held to a minimum.

Decorations are added while the seals are still in continuous tubing form and while the cellulose is still approximately 75% water. The design is impregnated into the cellulose material, thus becoming a part of it, not subject to rubbing or wearing off. Also, duplication by unauthorized persons is a practical impossibility in view of the complex manufacturing processes involved in producing a decorated cellulose seal.

The usual finish or surface effect of a cellulose seal is a dull sheen without grain or texture. The seal can be completely transparent, completely opaque or a combination of opaque with transparent strips or "windows" at the side. The latter type is most frequently used on liquor bottles, where the transparent window is necessary to permit the Government tax strip to show through. Using this type of cellulose band not only provides visibility where it is necessary but also assures protection for the stamp strip. Newer finishes are frequently being introduced. One style, for example, is a very shiny opaque, particularly effective in black with white lettering in the decoration. This finish is shiny enough to compare with patent leather and offers opportunities for unusual packaging effects. Very good reproductions of metallic gold can be obtained in the opaque finish also, which is particularly attractive when used on packages bearing labels with designs in gold ink.

Cellulose bands used on the screw-cap or flange cork finish containers are open at both ends. They will shrink skintight over the top of the cap and conform to the contours of the bottle neck, depending upon the size used. Any length desired can be obtained. A second form of seal closed on one end is known as "caps." They are made in diameters ranging from 6 mm. through 80 mm. Length of the cap-style seal is limited—depending upon the diameter. This style seal is often used on glass vials where there is no other closure and, when specified in "transparent finish, clear," gives the package an effective "all glass" appearance. Many toothbrushes are packaged in such containers sealed with transparent cellulose caps. Cellulose seals also can have a horizontal line of perforations to permit extreme ease of removal of the seal.

Handling

Cellulose seals are shipped wet, packed into containers filled with a solution consisting of soft water with plasticizer, preservatives and inhibitors that keep them in perfect condition for long periods. In some cases seals have been known to keep perfectly for five years or longer. The preservative must remain in the seals to counteract mold and bacteria. The

plasticizer prevents brittleness after the seals have dried and shrunk on the containers. It is important to keep the cellulose seals in the solution in which they are shipped until they are used, because the manufacturer has designed the solution to protect the seal and assure you the best possible sealing results. Covers should be kept tightly sealed on metal shipping containers to prevent leakage or evaporation of the liquid solution. The seals are stacked with designs in one direction for fast application whether by hand or by machine.



PHOTO COURTESY AVISCO

Cellulose bands can give added sales power by repeating brand name or introducing a new merchandising feature, such as slogans or suggestions for additional uses.

Application

In the manual process, an operator places the seal while still wet over the bottle neck, then packs the packages in the shipping container. The cellulose seal dries while the shipping carton is in the shipping room. A skillful worker can apply approximately 35 to 40 bands a minute.

One type of applying machine has been developed especially for the purpose of applying the cellulose pre-cut bands on bottles. Groups of cut band seals are loaded into a magazine, where the seals are self-aligning and self-feeding. Oscillating vacuum disks pull the seals from the magazine, and pick-off fingers enter the seal. The machine continues operation, with an ingenious expanding device opening the seal, spreading it, so that it will fit over the neck of the bottle. Strippers drop the seal down onto the bottle neck and sealed bottles are discharged onto a conveyor.

Another cellulose banding machine uses the seals in roll form. The machine cuts the bands to the desired size and applies them. In the case of decorated seals, an electronic feed mechanism accurately cuts off each band. An electric eye determines band length before cutoff, assuring positive registration. A bottle spotting mechanism is also available to position the bottle accurately.

Models of the pre-cut and roll-form machines are available to handle a variety of bottle sizes with speeds ranging from 50 to 225 bottles per minute. Minor adjustments can be made on these machines in a matter of minutes to allow for a change in speed or in the size of bottle.

Although the majority of cellulose bands are still hand applied, machine application in a wide range of bottle sizes is being successfully carried on at present at various bottling plants in the liquor, wine, drug, carbonated-beverage and home-products fields. It is expected that machine application will also soon be a significant factor in other high-speed bottling.

In any case, whether application is by hand or by machine, care should be taken to assure that bottle necks and caps are clean and free from any spillage of the contents of the bottle. Foreign substances on the bottle can dilute the plasticizer content of the cellulose seal.

Special uses

No discussion of the cellulose seal is complete without mention of the more unusual uses which have been initiated for these versatile aids to packaging. For a tiny hearing-aid battery, where a paper label carrying instructions for use might slip off and be lost, a cellulose seal serves as a label. A set of plastic shower-curtain hooks are held together with a sturdy cellulose band. The consumer gets his full count, the packager saves the cost of a cardboard carton, the retailer saves space on crowded notion counters. Here again the cellulose seal is also used as the label—with brand name and all text ordinarily appearing on carton or paper label incorporated in the decoration on the seal. In both cases considerable labor cost is saved by the use of cellulose seals. They are applied much faster than small, hard-to-handle paper labels of a similar size. Cellulose seals have proved ideal for gift decanter packages. Not only have they been used to hold on bulky, special-design closures to the package, but also as unobtrusive, quality-effect labels for the decanters.

Cellulose bands can also be used to hold a seasonal decoration in position, but are removable by the dealer, if all stock is not sold, after the holiday. Even more versatile an application is the use of cellulose bands to combine units in introductory offers or premium programs.

Cellulose seals are now in use by at least one brewery. The application of a short 15-mm seal over crown caps prevents normal dust and dirt accumulation under the open sections of the cap. The many consumers who drink beer directly from the bottle like the cleanliness and sanitation afforded by the cellulose seal.

The increasing use of these multipurpose cellulose bands—in a variety of industries—emphasizes the decorative and functional uses which the seals serve. In conjunction with their use as an important secondary closure or attractive label—or both—cellulose bands help inspire consumer and retail confidence in sealed products.

A new development

The newest idea in cellulose seals is the development of a perforated tear strip with a tab. A gentle pull on the tab quickly and easily removes the upper portion of the seal, permitting the closure to be removed and replaced at will by the consumer. The lower portion of the seal remains on the bottle, with trademark and other decorative material staying put for the life of the package. The seals are made in conventional style or with windows at the sides for visibility of tax strips on liquor bottles.

PHOTO COURTESY THE APPLICATOR CO.



Daubers for liquids and pastes are shown here; also closures with wicks used for air fresheners.

PHOTO COURTESY CALMAR CO.



These applicators, sprayers and dispensers serve many products including cleaning fluids and hand lotions.

Opening and dispensing devices

One of the best-defined trends in packaging today is the emphasis placed by packagers and consumers on convenience. And, when it comes to convenience, there is perhaps no aspect of packaging that offers greater opportunity than simply making the product easier to use. This is especially true because of the self-selling role packages have taken over so successfully, and also because of the across-the-boards shift to "do it yourself." Today the "working package" and the consumers are teamed up in a multitude of activities that range all the way from housework to recreation, hobbies and personal grooming. More and more, the consumer is looking for packages that will ease the work, save time and help the novice become an expert—in all sorts of chores, such as cleaning, painting, repair work, gardening, etc.

The subject of easy opening and dispensing, of course, is far from new. Favorites like the bottle, collapsible tube, key-opening cans, the handy oil can and the screw, lug and cap closures[1] owe much of their popularity, each in its own way, to ease of pouring, dispensing and opening.

Meanwhile, in recent years, packages like the squeeze bottle and the aerosol[2] have come along and presented new opportunities. The net effect has not, however, been the outmoding of other types of dispensing packages; instead it has been a challenge stimulating packagers to give new consideration to efficiency regardless of the type package used.

Evidences of this are to be seen in

[1] See "Closures for Rigid Containers," p. 365.

[2] See "Plastic Bottles, Tubes, Jars," p. 286 and "Aerosols: Pressurized Containers," p. 319.

PHOTO COURTESY SEFTON FIBRE CAN CO.



Many types of pouring spouts and sifter tops are available for metal or composite cans. Products easy to use are used more often and repeat sales follow.



New type of dispenser for a deodorant employs the ball-point principle.



CROWN CLOSURES





for better sealing—





Crown's long experience in the science of sealing, its exceptional skill in precision manufacture and its careful maintenance of correct tolerances are your assurance of trouble-free application on your production line and efficient, dependable sealing on your containers. A wide variety of liner materials, many of which are exclusive with Crown; a tremendous store of data on the suitability of various liners for specific products; and unsurpassed Customer Laboratory Service are other reasons why it pays to make Crown your "sealing headquarters."



LABORATORY SERVICE

Crown maintains two laboratories. One for research and development, the other as a customer's consulting service. The services of the latter are available without cost to help packers select the closure and liner best suited for their individual products.



for better selling—





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DESIGN SERVICE

Customers of Crown may use without cost the services of a comprehensive design service. New designs will be created or adapted from present labels or trademarks.

CROWN CORK & SEAL COMPANY, INC.

Closure Sales • Baltimore 3, Maryland

World's Largest Maker of Metal Closures

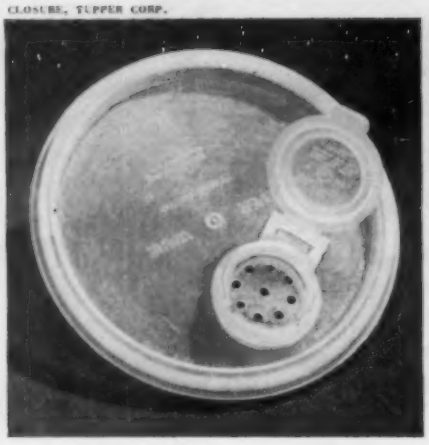




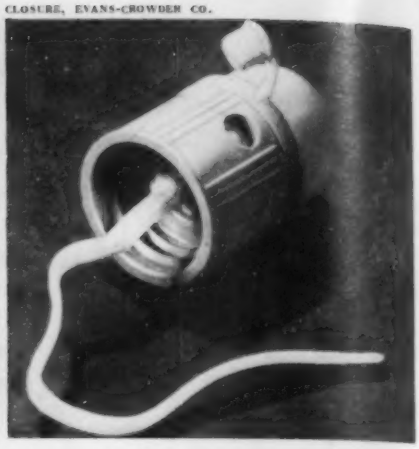
CLOSURE, WHEATON PLASTICS CO.



CLOSURE, TUPPER CORP.



CLOSURE, EVANS-CROWDEN CO.



Polyethylene snap-off closure on Sani-Flush can replaces a pry-off cap. The duplex polyethylene closure, center, is a wide-mouth lid with a sifter top and pouring spout. Closure at right is a molded-urea atomizer for a lens cleaner.

PHOTO COURTESY FEDERAL TOOL CORP.



Dispensing re-use closure is available in plastic or chrome top. It is popularly used as a premium.

the no-drip pouring spout developed for turpentine and detergent cans; the tear string for fibre-bodied composite cans; the new tear tabs developed for cellulose shrink-on bands; pre-punched sifter tops sealed with pressure-sensitive tape; new pouring spouts for paper containers for milk; retractable polyethylene spouts for pails and drums; the variety of dispenser packs for razor blades; plastic reels for adhesive bandages and a host of easy-opening and dispensing packages for pharmaceuticals and personal products. This list could be expanded many times over without exhausting the examples that have been introduced in recent years and, even so, such a list would scarcely do more than outline the many challenges and opportunities the field affords. Some of these packages have carried their products to new sales heights, just as some of the older devices have helped keep their products among the favorites for many years—and just as new devices to be developed through imagination and research will provide the competitive advantages of tomorrow.

For example, the ball-point-pen principle of dispensing has recently been introduced in packaging Bristol-Myers' roll-on "Ban" deodorant. The components of this ingenious dispenser include a polystyrene neck ring, marble and transparent screw cap. When the cap is tightened on the container, the marble is locked in place, thereby providing an effective seal. When the closure is loosened, pressure against the ball top causes it to revolve and dispense a convenient, dripless film of the liquid lotion.[3] A ball-valve dispenser, employing an aluminum cap and a stainless-steel ball bearing and spring, is being used on a metal collapsible tube that holds an aqueous, rubber-base adhesive.[4]

Success in the use of the ball-point principle, reportedly, is highly dependent on the properties of the product to be dispensed. Each product seems to demand package construction tailored to the specific job. In this connection, it is interesting to note that an all-plastic and an all-metal ball-point applicator have been pioneered—one for a glass bottle and the other for a metal tube. Thus ball-point dispensers would appear to offer a fairly wide range of adaptability.

The field of easy-opening and dispensing devices does not lend itself to ready classification nor simple success formula. However, the following points are elementary:

Special opening and dispensing devices are indicated when the product:

1. Has critical protection and closure requirements.
2. Is dangerous, messy or hard to handle.
3. Must be used in minute or precisely measured quantities.

Special devices are also best indicated when their ratio of cost is well in balance with the efficiency and economy they afford the consumer.

As a rule, most working packages cost extra money. The successful ones make the product go farther and/or do a better job so that the customer willingly pays a premium price. Obviously, though, a dispenser or special closure that costs a dime would have an uphill fight in merchandising a commodity that ordinarily retails for 10 cents. In other words, except where outstanding utility or re-use are involved, the simpler the closure dispenser the better.

Types of openers and dispensers

Among the better-known types of easy opening and resealing closures are those that have a lever device or those that unlock by simply pressing down on the cap and are then relocked in place by pressing on the sides of the cap.

Sifter and shaker tops in a variety of styles and constructions are effectively used for products such as scouring powder, seasonings and other free-flowing items used in small or controlled quantities. The retractable pouring spout, of course, is a popular part of salt containers.

Liquid or paste products employ closures fitted with daubers or special applicators. The sprinkler-top bottle, the medicine-dropper closure and the

[3] See "Roll-on Deodorant," MODERN PACKAGING, Jan., 1953, p. 80.
[4] See "Ball Valve for Glue," MODERN PACKAGING, April, 1955, p. 164.

PHOTO COURTESY FERDINAND GUTMANN & CO.



PHOTO COURTESY OWENS-ILLINOIS GLASS CO.



Closure that protects flavor of grated cheese has a convenient sifter top. New type of polyethylene milk-bottle closure, right, can be washed and used over and over.

dauber closure for library paste are standard types in this category.

Polyethylene, because of its moldability, flexibility, inertness, durability and relatively moderate cost, has given rise to some of the most important advances in the field of efficiency closures. The nebulizer fitment, drop dispenser, powder-puffer fitment and many types of pouring spouts have all made important gains on the basis of polyethylene's excellent adaptability to the requirements for these special types of dispensing closures. Other plastics—vinyl, acetate, polystyrene, phenolic, etc.—have also provided new opportunities in the development of dispensing packages.

A special class of dispensing devices includes the pump-type spray tops used for window cleaners, perfumes, hand lotions and the like. Dispensers of this type are available with a stroke capacity up to 1 oz. for gallon-size or larger containers. There is also a nylon sprayer for colognes and toilet waters and there are special dispensers for ketchup and other foods.

A popular re-use dispenser top is the syrup-server type of closure for glass bottles, which has a serving handle and a sliding, thumb-operated, cutoff dispenser.

One of the most novel dispensers introduced recently is the polyethylene spout that swivels from a closed to open position. This dispenser is used on a can for a popular brand of lighter fluid. Another novel dispenser is found on a can of industrial-type hand soap. Pressure on the can's "floating" lid ejects the soap.

Although the special opening and dispensing device is most frequently associated with bottles and cans, the field obviously is not restricted to these types. Some of the handiest packaging "tools" are found on the flexible container, for example, the tear tape, both on pre-fabricated bags and in-plant formed wraps and pouches; the plastic tie, the drawstring closure and similar devices on produce bags; and the new press-to gripper for plastic bags, which works like a zipper fastener.

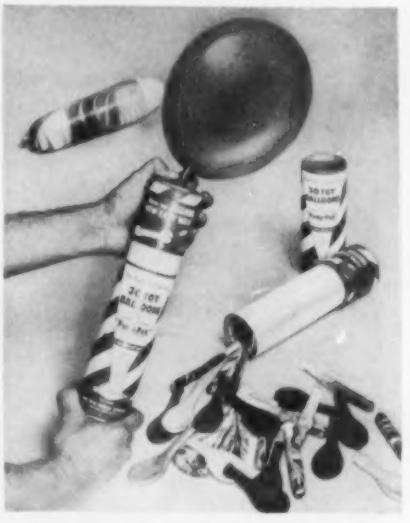
The folding box and the set-up box by basic construction are easy-opening packages. Modifications, moreover, can ingeniously incorporate special dispensing feeds. For example, folding boxes adopted for strip bandages, salt tablets and pharmaceutical vials have a slot or drawerlike construction at the bottom of the container to feed units one at a time. Other folding-box constructions incorporate reel or windlass-type feeds that are particularly effective for units which are strip packaged, including samples. Functional closures have long been a feature on certain types of shipping containers—valve-type openings on heavy-duty bags; pouring spouts on drums and pails; and more recently the booming adoption of tear-tape-type opening devices in fibreboard shipping containers. The tear-tape shipper appears likely to become as universal in its field as the tear strip on flexible primary containers.

Summary

Dispensing closures, it will be seen from the foregoing, are adapted to specific types of containers and particular types of products. However, it is obvious that many of the principles now used could be adopted with a little ingenuity for many products that have not previously sought the efficiencies of the modern working or dispensing package.

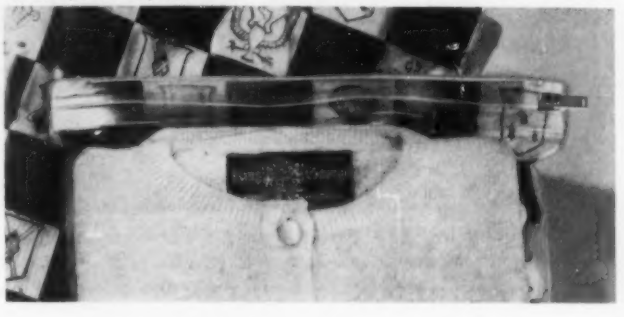
Perhaps the starting point for any packager is to ask himself "How can my package be made easier to use (so that it will be used more often)?" And the second question follows: "How have other products—from soups to axle grease and from drops to gallons—already solved the problem?"

PHOTO COURTESY HARCORD MFG. CO.



This "working" package converts into pump that blows up balloons.

FASTENER, FLEXIGRIP, INC.



Vinyl bag for sweaters has a plastic zipper that keeps bag tightly closed and protects the sweater from mildew, moths, dirt.

Marking glass containers

by ANTHONY VELONIS*

When decoration and labeling are considered, glass and ceramic packages pose some ticklish problems. From an artistic as well as utilitarian aspect, paper labels have limitations—namely, obscured contents, ignored merchandising value of glass itself and the relative impermanence of glue and paper. Labeling applied directly to the glass surface has provided the answer for heavy-duty tasks and lighter, decorative touches. Developments along this line are responsible for putting the multitrip milk and beverage bottle high on the list of economical containers. In addition, refinements in techniques and materials have provided a decorative medium which is difficult to duplicate in permanence, color and effect.

There are several techniques used in applying color directly to glass and ceramic surfaces: screening, offset, dusting and fusing, decalcomania, etc. Applied color labeling, "ACL," however, is the method generally used in the glass-container field.

"Screen process" is the most widely accepted method of applying color to glass. Briefly, this starts with an open mesh material, which is stretched tightly on a wooden or steel frame. The mesh is impregnated with a photo-sensitive emulsion, exposed and developed in a manner which parallels photo-engraving, except that there is no plate to be etched. Instead, the resistant film becomes a stencil which is firmly adhered or impregnated with the mesh material.

Although the method has been referred to as "silk-screen printing," it might be better to revise this to "screen stencil printing," inasmuch as other materials are fast supplanting silk. In the glass-container field, stainless-steel mesh screens are almost universally used. Monofilament nylon mesh has also become more important for this purpose.

These stencil screens are clamped to a machine, usually semi-automatic, which moves the screen in a straight-line stroke across the container which is being turned and printed. Directly over the axis of the bottle is a wedge-shaped rubber squeegee which forces the glass paint through the open areas of the screen as it moves.

This "glass" paint is a vitrifiable pigmented mixture containing oils or waxes which act as temporary vehicles. The organic materials burn off in a continuous furnace or "lehr" at a temperature below 900 deg. F. The temperature rises, and the remaining inorganic powder coalesces, or "matures," at from 1,040 deg. F. to 1,150 deg. F. (depending on the materials) into a glossy, impervious color, permanently fused to the glass.

Continuous mesh-belt furnaces average about 100 ft. in length. The firing cycle or time for the glass container to pass through the lehr may take from 1½ to 3 hrs. The variation depends chiefly on the glass and its wall thickness, since re-annealing is necessary to maintain the strength of the glass.

Advances in handling and production have kept "ACL" prices from rising with other costs. Custom printers, who at one time specialized in short runs, find they can offer greater economies in runs over 10,000 pieces. Advances in printing technique have increased legibility, accuracy and attractiveness of the finished glass container. There has also been an increasing use of gold decorating.

Refinement in the physical qualities of gold printing pastes has led to the mass production of really handsomely decorated containers which one would normally expect to be the slow product of painstaking craftsmanship. These gold pastes (or other precious metals: platinum, palladium, rhodium) are formulated with precisely controlled laboratory techniques and are basically made up of gold in solution with fatty acids and resins. When the printed glass is fired through the furnace, the gold is deposited directly as a thin film on the glass surface.

A method which has extended the range of screen process has been the use of a thermoplastic or "hot" medium to carry the vitreous coloring matter. When the hot paint is printed, the room temperature of the glass surface sets the paint instantaneously, so that a number of colors may be printed in rapid succession. Greater detail, "wrap-around" techniques and accurate registration also result. New machines to exploit this advance have been developed, although these are hardly adaptable to anything but continuous large-volume production.

* Ceragraphic, Inc., Newark, N. J.

PHOTO COURTESY CERAGRAPHIC, INC.



Applied color labeling, perhaps the most common method of decorating glass surfaces, offers superlative decorative effects and the flexibility needed to handle custom-molded shapes exploiting the beauty of glass itself.



Erno

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As wholesale factory distributors for many large, nationally recognized manufacturers of glass and plastic bottles, metal, molded plastic and polyethylene caps and corks, we are able to render quick, reliable, undelayed service. Extensive stocks in a full variety of sizes, are maintained at all times, assuring you of exactly the item you want, at the time you need it.



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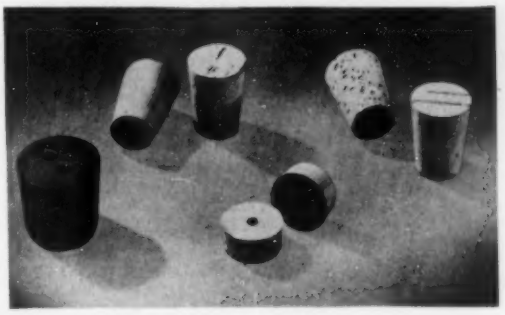
Erno for caps

Metal screw or lug caps, also molded plastic and polyethylene, slip-on and continuous thread caps. Short, medium or long skirt in all standard sizes and most types of liners, are continuously kept in stock ready for immediate shipment. Also, metal caps with plastic sprayers.

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(wood, plastic, rubber)
Cork Balls ¼" to 6"

ERNO can supply small and large size corks for all purposes. All grades are available in large quantities; Short, Regular Taper, Extra Long. Sprinkler corks in sizes 0000 to 10. Small corks for vials. Sheet cork. Shell, Straight, Flange-Top Composition Corks. Also, Rubber Laboratory Stoppers, du Pont "Cel-O-Seal" Bands.



Erno for the "poly-seal" closure

Supplied by ERNO, it's a "first" on the American market: a practical screw-cap with a polyethylene cone liner. Eliminates costly leakage, evaporation, contamination, binding, and back-off. It maintains the chemical or composition balance of the original product.



It's Poly-ethy-lined ®

ERNO has also an extensive selection of laboratory supplies in enamel, stainless steel, ceramic, aluminum, rubber, glass and plastics.
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SECTION 11—The packaging production line

Listings do not necessarily cover entire lines of advertisers nor all producers in each category.

AIR CLEANING EQUIPMENT FOR BOTTLES

Pneumatic Scale Corporation, Limited 414, 415

AMPUL FILLING & SEALING EQUIPMENT

Popper & Sons, Inc. 400

BAG & ENVELOPE CLOSING AND SEALING MACHINERY

Amsco Packaging Machinery, Inc. 469
Arenco Machine Co., Incorporated 401
Fry, George H., Company 430
Mercury Heat Sealing Equipment Co. ... 461
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Gisholt Machine Company 453

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Trescott Co., Inc., The 482

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Post Machinery Co., Electronic Products Div. 398
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A. Dry B. Liquid
C. Pressurized (aerosol) D. Tubes, Collapsible

Arenco Machine Co. Incorporated (A, D) 401
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FULLY AUTOMATIC PACKAGING MACHINES

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Counsel Machine Company Inc. 399
Hayssen Mfg. Company 457
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Heat-Sealing Equipment 462

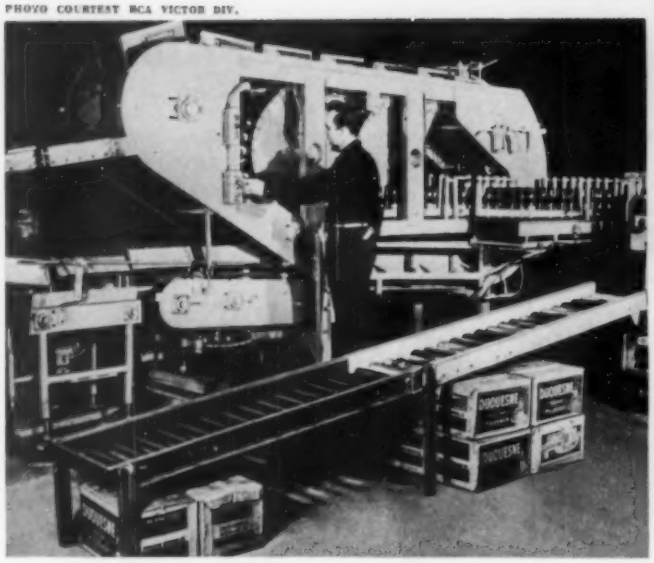
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PHOTO COURTESY RCA VICTOR DIV.



Automatic uncaser and washer loader handles up to 960 bottles a minute. Installation is at Duquesne Brewing Co.

PHOTO COURTESY ATLANTA PAPER CO.



Carton openers have become an essential to the bottling industry. This unit sets up "Coke" six-bottle carriers.

Feeding the line

Equipment for feeding the packaging line includes such machines as unloaders, unscramblers, accumulators and bottle cleaners. This equipment gears the line to the individual speeds of the packaging equipment and contributes importantly to quality control, efficiency and economy.

Unloaders, which remove the empty containers from their shipping cases, are available in three basic types—the gripper type, which removes the container with mechanical fingers; the vacuum type, operated with differential air pressure, and the electromagnetic type. The unloader selected depends largely upon the type of container. Narrow-neck bottles, for example, can be lifted from the case by the mechanical fingers of the gripper unloader. Metal containers also may be removed by the gripper type or by the electromagnetic unloader. Wide-mouth jars, usually packed bottoms up, are best removed by the vacuum type, which applies a vacuum cup to the base of each jar.

Unloaders may be equipped with flap openers, which automatically open the flaps of the shipping case and present the case to the unloading head with all flaps horizontal.

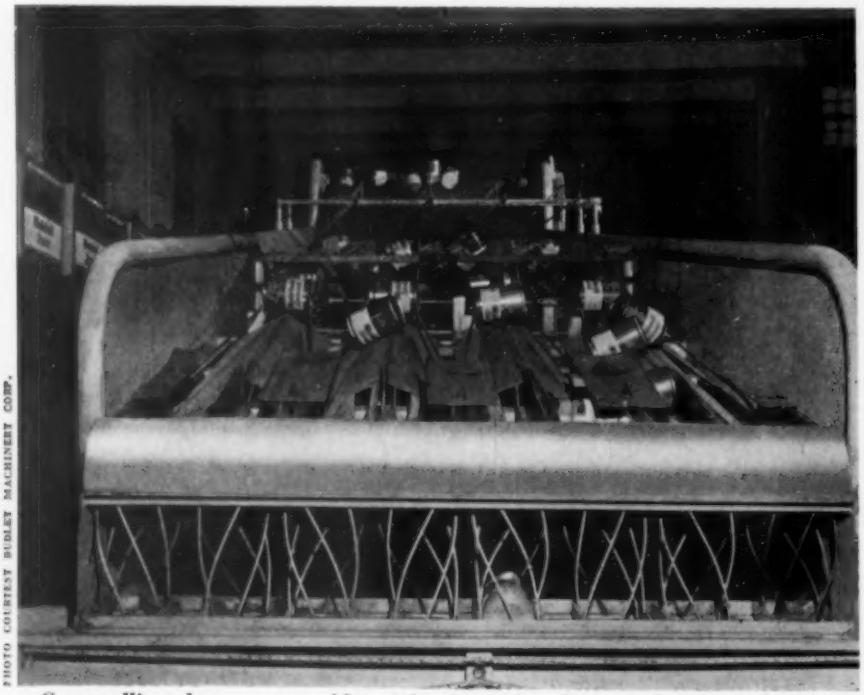
Unscramblers receive massed containers and deliver them in a single line to other machines on the line. They are used primarily where new containers have been manually unloaded and dumped on the unscrambler table.

Unscramblers vary greatly in design. Some of the principal types are belt, disk, gate, reverse-flow and oscillating-bar models.

Accumulators play a major role in keeping the packaging line running smoothly. By serving as temporary storage points or as cushions in the line, they maintain continuity of container flow and thus avoid jams or shutdowns when variations in operating speeds exist between machines.

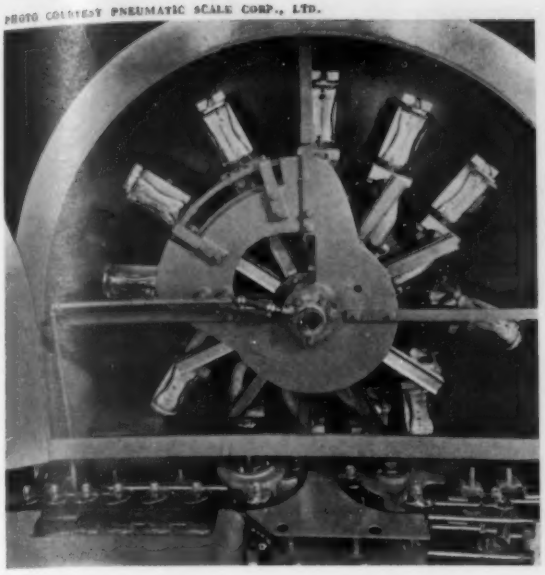
The two principal types of accumulators are the disk-type accumulating table and the steel-trough type, which is attached to a conveyor belt. Where space limitations prohibit extending the conveyor in a straight

PHOTO COURTESY BUDLEY MACHINERY CORP.



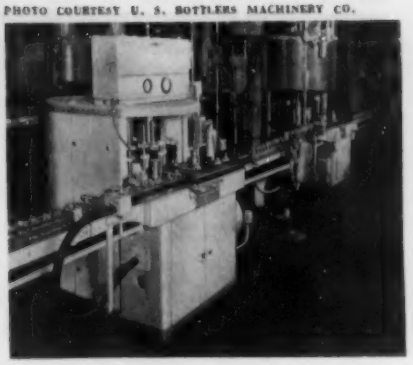
Cans rolling down unscrambler right themselves because bottom is heavier than open top. They drop (foreground) on take-off belt in single file.

PHOTO COURTESY PNEUMATIC SCALE CORP., LTD.



View of rotating mechanism of air cleaner showing steps of transferring bottle from incoming conveyor, inverting, cleaning and then discharging.

PHOTO COURTESY U. S. BOTTLERS MACHINERY CO.



Automatic air cleaner for bottles is synchronized with automatic filler at The Toni Co.

line, it may be doubled back on itself to provide the storage space needed for the steel trough.

Bottle cleaners

Bottle-cleaning equipment is of fundamental importance to the manufacturer's quality control. In cleaning re-use bottles, elaborate washing, scrubbing and rinsing precautions must be observed to assure proper sanitation. New bottles may require washing to guard against glass particles, carton dust or paper fragments.

As a link in the packaging line, bottle cleaning must keep pace with the tempo of other machines while meeting rigid sanitary requirements.

Washing new bottles. Two types of cleaning processes are available for cleaning new bottles: rinsing and air cleaning. Selection depends upon the product and upon the quality of water available. Water rinsing often leaves a small residue of water in the container, causing difficulty for products like liquor, where the proof is affected, and products having an oil base. Water rinsing may also leave a mineral residue, unless the water is treated.

Water rinsers. Rinsers may be obtained within a wide range of automaticity. One type of automatic rinser feeds the bottles into pockets on a carrier which moves the bottles inside a hood. Each bottle is air blown to remove lint and dust, then given a conditioning spray of service water and a pre-rinse. The carrier inverts the bottles in their pockets and rinse water is injected into each bottle through a nozzle. Still inverted, the bottles are drained, carried to an upright position and transferred from their pockets to a conveyor.

Where it is necessary to assure bottle dryness, driers can be synchronized with washer operation.

A typical semi-automatic rinser is the rotary-table type. A large number of spouts are set upright on the table and operators invert the bottles over the spouts. They are then automatically carried under a hood, where internal and external sprays are applied.

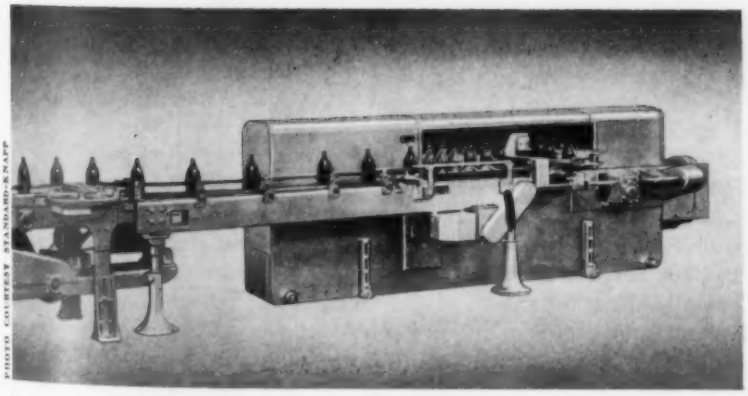
When installing rinsing equipment, plumbing facilities and arrangements should be considered, as well as the possibility of scale deposition in the piping, resulting from hard water. Both can affect the volume of water.

Air cleaning. Air-cleaning equipment is also available in varying degrees of automatic operation.

A completely manual-type cleaner is operated by placing two bottles at a time against air tubes.

A more automatic type receives the bottles from a conveyor, automatically injects air into each bottle individu-

PHOTO COURTESY STANDARD-KNAPP



Pocket-type washer includes air cleaning, conditioning spray, hot wash and rinse plus draining of bottles.

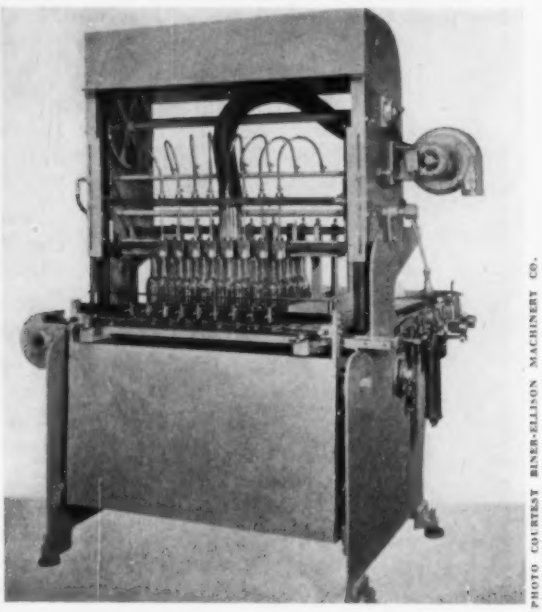
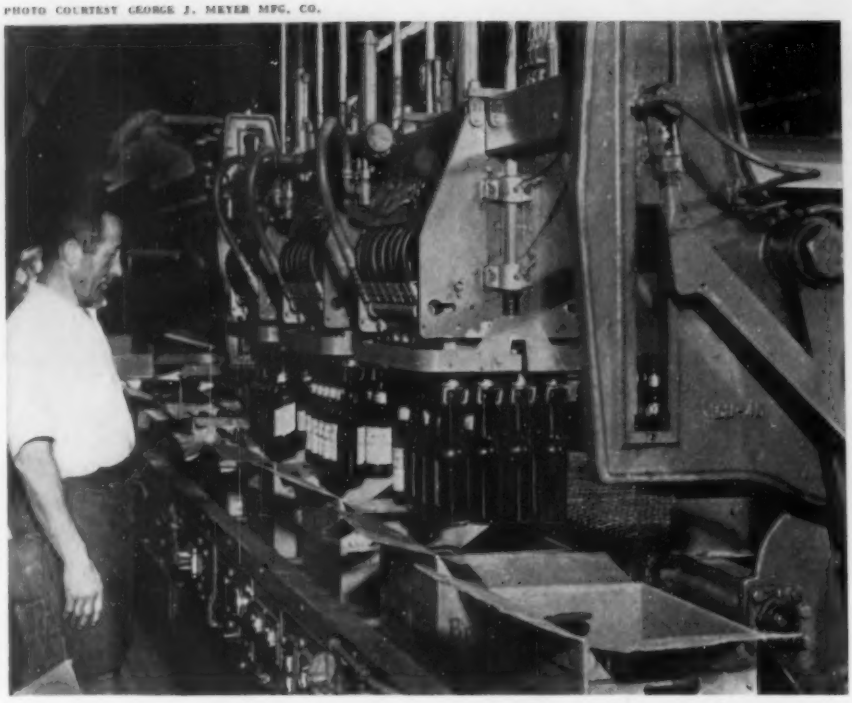


PHOTO COURTESY BINER-ELLISON MACHINERY CO.

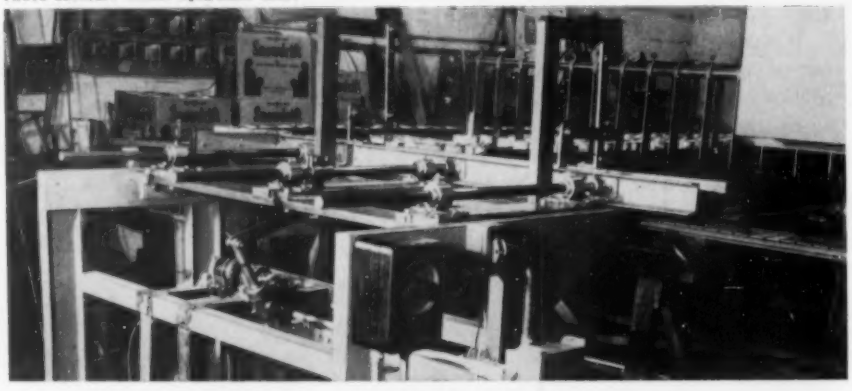
Air-cleaner unit simultaneously cleans, unscrambles round, oval and rectangular containers. Speed is up to 150 units a minute.

PHOTO COURTESY GEORGE J. MEYER MFG. CO.



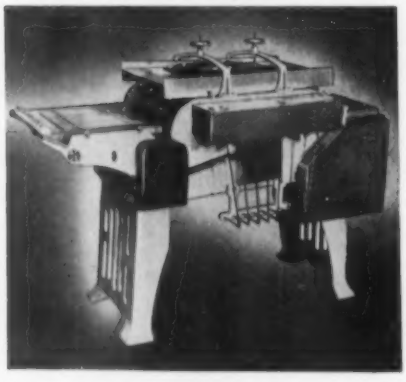
Uncasing machine on returned-bottle line lifts contents from three cases simultaneously up to conveyor leading to soaker and washer.

PHOTO COURTESY ISLAND EQUIPMENT CORP.



Broad-belt infeed unit handles straight-sided containers, transfers them from straight line to wide rows. Speed is adjustable.

PHOTO COURTESY POPPER & SONS, INC.



Ampul washer automatically feeds, washes 6,500 sterile vials an hour. Sizes may vary in the same batch.

ally and discharges the bottles back to the conveyor through a star wheel.

A large group of automatic air cleaners operates on a rotary principle. One type moves the bottles onto barrel-like holding devices, then inverts them over air nozzles.

Another rotary-type cleaner moves the bottles to individual cleaning stations, where they move into position on the station platform. Mechanically operated cleaning nozzles extend into the bottles, while the cleaning head rotates clockwise, thereby inverting the bottles. Air is injected at pressures of 60 to 90 lbs. and a vacuum tank sucks away the dust and dirt.

There is also a rotary machine that has a paddle wheel fitted with 12 vanes. Three parallel chain conveyors operate in conjunction with the wheel. The first introduces the bottles into the paddle wheel and, by means of a deflector, passes them to the second conveyor directly under the wheel. The bottles, lodged within the vanes, are swept through a complete revolution in the vertical plane and one or more blasts of compressed air are applied to each in the inverted position. After cleaning, bottles are deflected to the third conveyor which brings them to the filling stations.

Another rotary model holds each bottle rigidly at top and bottom and whips it into inverted position. Air pressure forces an air nozzle into the bottle neck. The nozzle drops out when the air valve closes and the container swings back to an upright position. The bottles are discharged to the conveyor through a star wheel.

Washing re-use bottles. Re-use bottles require much more care in cleaning than new bottles. Washing includes internal and external cleaning with hot caustic solutions, live steam, hot water and clear cold-water rinses. For certain products, such as beer, water for final rinsing must be filtered to remove chlorine.

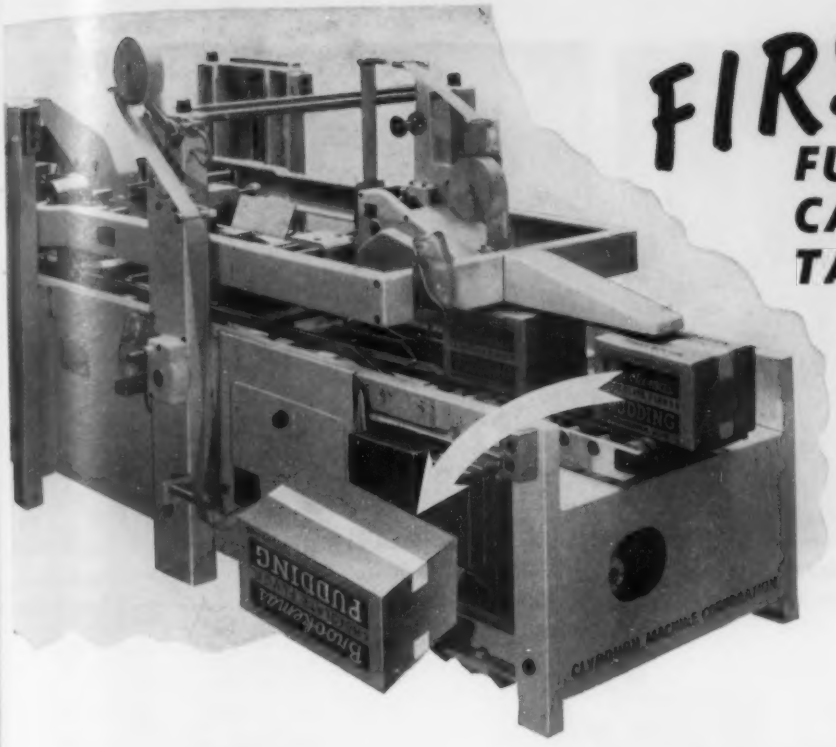
In addition to numerous liquid rinses, re-use bottles are thoroughly scoured inside and out with brushes.

Machines used for the sterilization of re-use bottles are large and are limited in the ware they can handle.

One type of beer-bottle cleaner carries the bottles through a soaker on a steel belt that holds 24 bottles across its width. The bottles are carried from the soaker in an inverted position to four rows of jets, where each bottle receives four individual rinses. At the first two jets, rinsing is done with brushes; on the last two, by injecting filtered rinse water through nozzles which enter all the way into the bottles.

Washing ampuls. Ampuls, tubes and similar glassware may also be cleaned on automatic washing machinery. One type applies a cleansing solution to the containers at each of eight stations, then discharges them to an autoclave or filling machine. Sufficient time is allowed at each station to insure washing and drying without mixing of fluids.

A high-speed, rotary machine is used for washing ampuls for the packaging of rare drugs.



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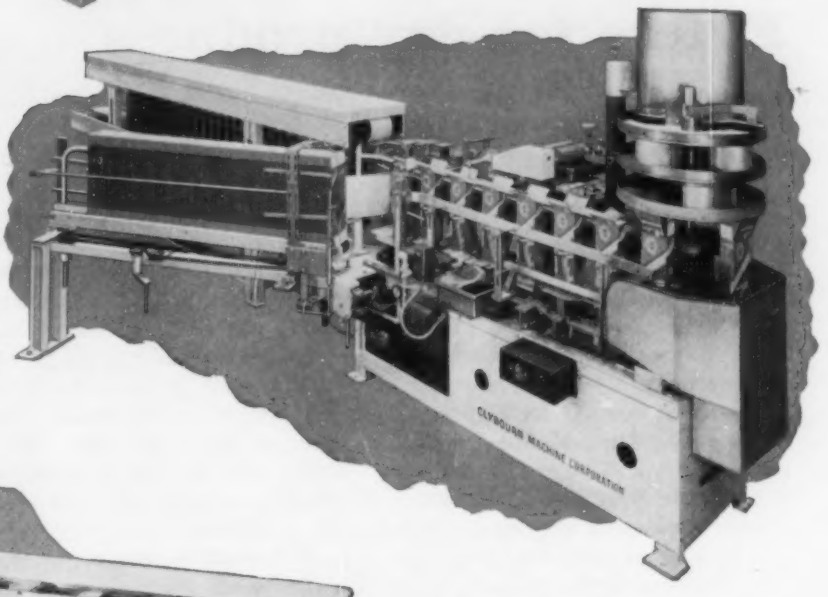
- *Automatically* glues and tapes top and bottom in one pass.
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- *Controlled glue application*—glues any part or the entire flap area.
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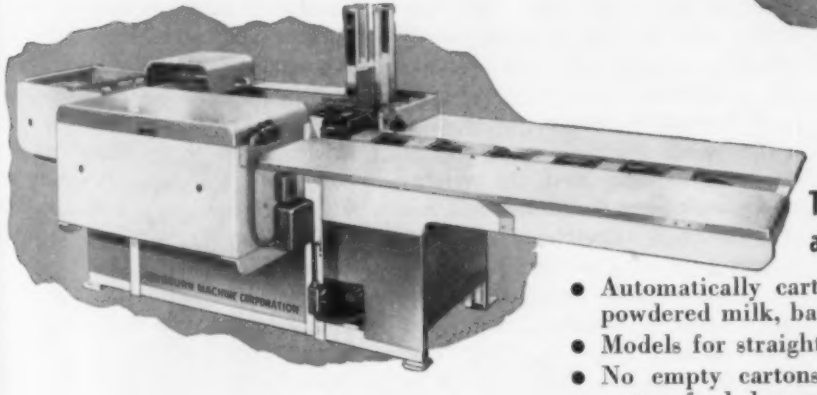
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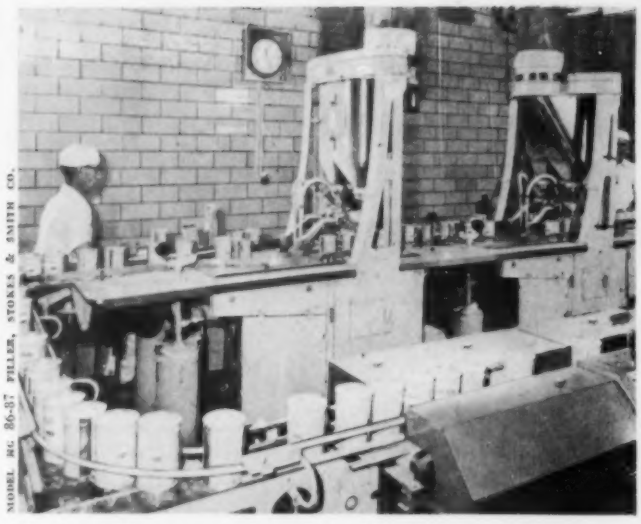
- Automatically cartons bagged or solid products, such as powdered milk, bar soap, candy bars, ice cream bars.
- Models for straight or reverse, or glue end cartons.
- No empty cartons. When a conveyor pocket is empty carton feed does not operate.
- Speed adjustment from 40 to 80 cartons per minute.

Many other features described in Bulletin No. 20.

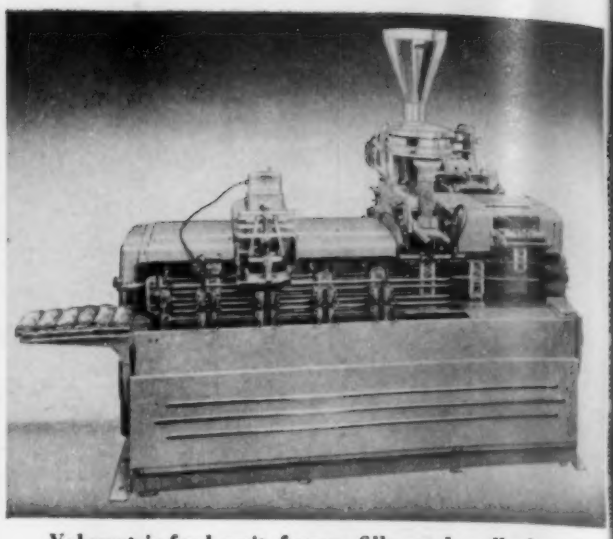
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Fillers for dry products

by C. A. CLAUS*

Filling equipment for what is termed free- or semifree-flowing dry products can be divided into three major classifications with variations and combinations of each: (1) weight scales, (2) volumetric measure and (3) auger fillers.

The great demand for high speed has encouraged considerable development work on all three methods and it is difficult, if not impossible, to specify any one method as being generally best or most practical because of the great variation in the products to be handled for which one method may provide a more successful solution than the others.

Weighing fillers

Weighing of the product before filling into a container stems from early hand operations and is the most commonly known method of filling. When the weighing is done prior to placing the product in the package, it is known as a net weight. If, however, the weighing is done directly in the container itself, then the combination, or gross weight, of product and package is taken.

It can be appreciated that with a gross-weighing filler you will actually obtain variations in the net weight of the fill, the variations being directly related to differences in weight between the individual containers. As there is greater variation in certain types of containers than in others, careful study is necessary before a gross-weight method can be selected. This is to make sure the customer will receive a most nearly correct measure of the product he purchases.

With material such as paperboard, and where a relatively small size of container is being used, the weights of the containers themselves will run very uniform. Therefore, a gross-weight scale for a product packed in a moderate-sized paperboard container could be considered one of the most efficient ways of filling that particular container. There is apt to be more variation in the weights of containers when they are made of glass or other material, the thickness of which cannot be accurately controlled. Here it might be more prudent to use a net-weight type of scale on the filling machine.

With a net-weight scale the product is weighed on a balance beam in a separate receptacle and, the receptacle always being the same, its weight on that scale will also remain uniform but within the limitations of such a mechanism. The material as weighed in this receptacle, after satisfying certain conditions of balance, is dumped into the package as the final and complete fill.

To satisfy requirements of speed, it can be appreciated that a multiple number of packages must be filled at one time to gain high production. Sometimes production lines are split so that the packages will go through a series of filling units, because of the slower speed of the filling unit compared with the package-making unit. Then the packages are reaccumulated after filling for their top sealing or closing.

Scales, however, are not always an assurance that you are getting exact fills in your package. A great deal depends upon the product stream that is being directed into the receptacle or package on the weighted beam. The cutoff of this stream, at the time of indication that the weight has been satisfied, is one cause for variation. It must be remembered that there is a space of time consumed between the moment a package indicates it has reached a weight and the moment the cutoff works, when the additional material that is still in this stream flows into the

* Formerly with J. L. Ferguson Co., now Manager, Eastern Sales, for R. A. Jones & Co., Inc., Cincinnati, Ohio.

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package. This final flow can never be definitely determined. Sometimes it is a heavy flow and sometimes it is lighter, so that variations are apt to occur at this point.

Scale equipment requires continual attention and cleaning in order to assure accurate operaton. Vibrations will interfere with uniformity of operation. Hence, the positioning of such equipment is of major consideration.

There are combinations of weighing mechanisms, where bulk charges are made, at one station, of a weight slightly below that necessary to bring it up to the full specification. The package is then tranferred to another station, where the final weight is dribbled in at a slower rate of speed. This minimizes the differential of material that comes from the cutoff spout the moment the cutoff operates and before the package moves on. This duplex method is also used to speed up the operation, permitting a faster flow in the bulk of the required amount.

Machines have been built so that the weighing and filling can be done in continuous operation or continuous motion. These are rotating types of machines, where the scales are receiving the product while they are revolving above the package. When the net weight is satisfied, it is discharged into the package just before the package is ready to move out of the unit. This means that the package is not standing still during the time of filling but rather is moving around the periphery of the machine, permitting higher speeds. This method is not necessarily capable of more accurate weights. Again, the scales are in motion during the time of filling, which may somewhat influence the accuracy of the final fill.

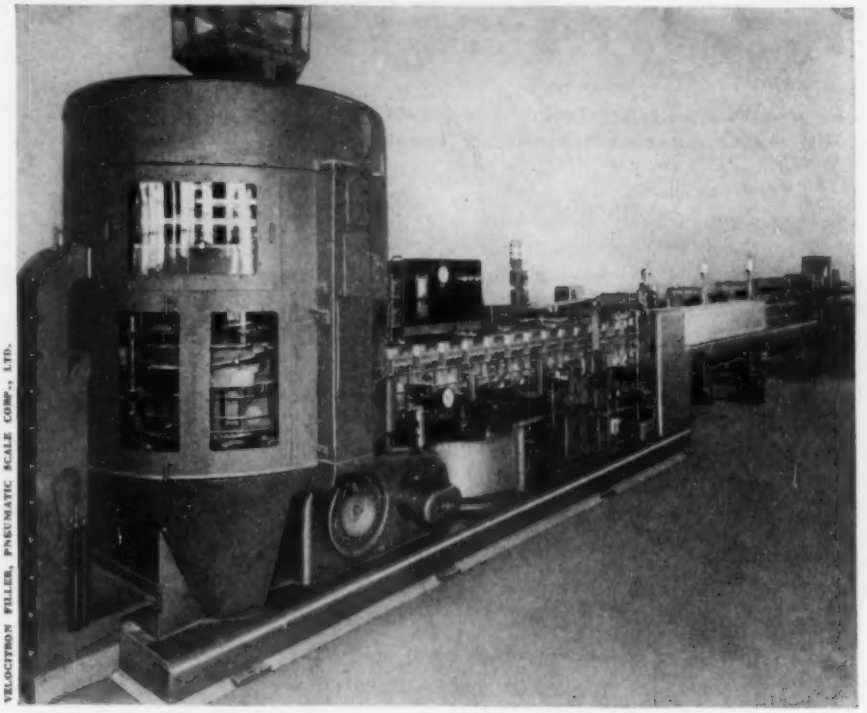
Volumetric filling

Volumetric filling is perhaps the tops for speed when high speed is required. Volumetric filling can be done at low speeds, too, in single-station machines, but there have been built high-speed, rotary-type continuous-motion volumetric fillers which are used by many concerns where the product to be filled is truly free flowing and runs fairly uniform in density.

The volumetric filler works on the principle that a definite volume of material will weigh a certain amount at all times. It is difficult in most commercial products to maintain product density so that a given volume will always weigh the same. Therefore, adjustments in the measuring device must be provided to compensate for varying densities.

Generally, in the operation of such machines an operator will check weigh packages during the day and as they weigh either over or under, she will operate a lever that adjusts the measuring cups to compensate for either the overage or the underage occurring at that moment. It can be appreciated that occasional attention is necessary to make these periodic adjustments.

It may be that certain "surges" occur wherein the density of a product will vary and the attendant may not catch these surges. To solve this problem and make checking unnecessary, an automatic adjuster has been developed. This unit does not weigh the individual package but instead will weigh a certain number of them at all times. Such a device is tied into the line with a separate conveyor and will be weighing, say,



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New-type installation filling detergent at speeds to 300 units a minute combines volumetric fill and continuous automatic check-weigh correction.

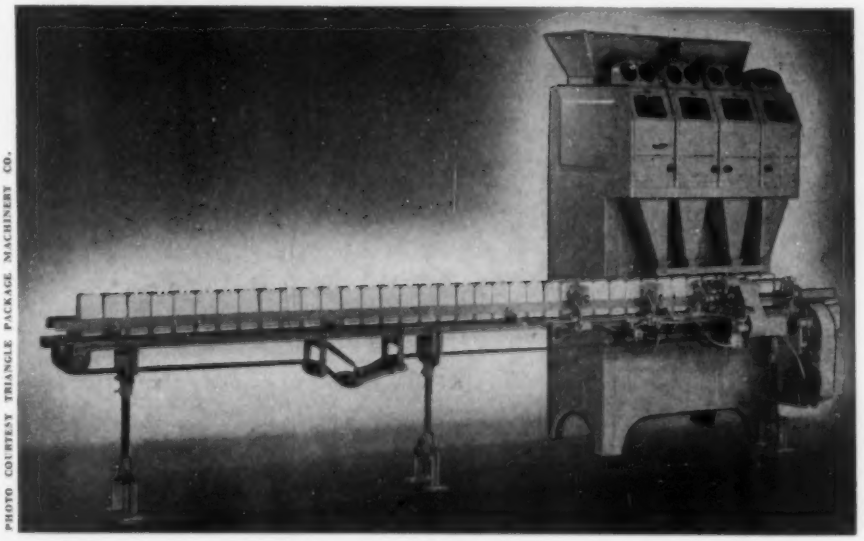


PHOTO COURTESY TRIANGLE PACKAGE MACHINERY CO.

Filler designed for fully automatic, high-speed registering and filling of cartons, cans or jars is adjustable for weights and container sizes.

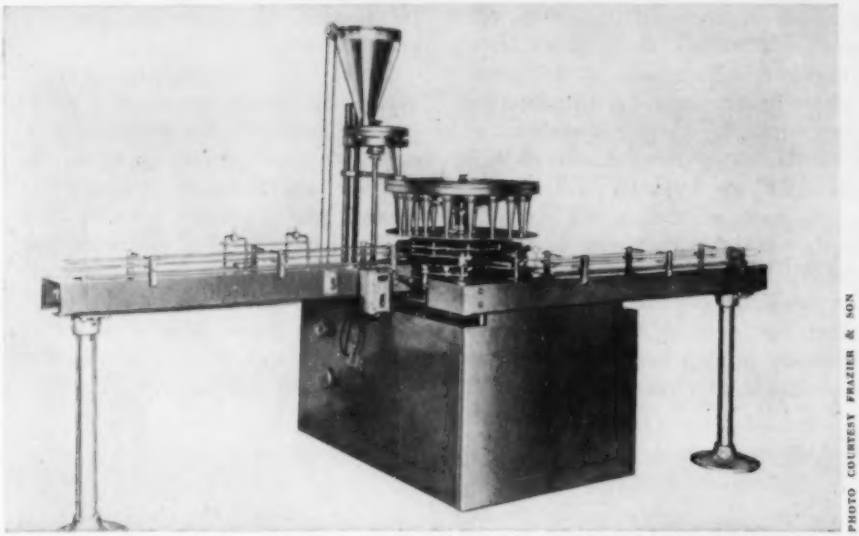


PHOTO COURTESY FRAZIER & SON

High-speed rotary powder packer incorporates vibrator for tight fill and special seating of container adapter spouts for elimination of dust.

10 packages continuously. If the total weight of these 10 packages is not correct, the balance will make a contact that operates a reversible motor on the adjusting screw. An underweight will operate the motor in one direction to compensate for this shortage. An overweight will make a different contact which turns the motor in the opposite direction to reduce the amount of fill. This is a good attempt to keep the average fill as uniform as humanly possible without rechecking each package.

In a good many volumetric fillers, a pre-measuring cup of some sort measures out a given volume of materials between definite spacers and this charge is dropped into the package at a given time. With this type of machine it is important that the head or weight of the product on the cup, as it is being filled, be maintained uniform because compression becomes a factor in the filling of certain materials. Bin indicators are used to maintain uniform heads during filling operations and very often machines are so constructed as to shut down when the bin has too great a head or when the head has dropped below a particular level.

Volumetric fillers are built in both intermittent and continuous-motion types for filling both single packages and a number of packages simultaneously. On the intermittent-operating type, where several packages will be filled at one time from several individual cups, they are generally above the packages and the product is carried by chutes or tubes to the containers themselves. On the rotary type, which is usually the higher-speed unit, the package enters on the periphery of the machine and as it is traveling around the periphery the measuring cup opens and drops the product into it.

An adaptation of this type of unit is obtained by using the package itself as part of the measuring device. The package is telescoped within the measuring cup or sleeve and acts as the bottom of the cup. When it reaches the bottom of the cup or sleeve, it enters the filling area and the sleeve is filled to the volume desired; then as the package moves around, on the rotary-type machine, it falls away from the sleeve and the product then fills from the bottom of the package toward the top, thereby minimizing dusting and assuring an easy method of fill. For variations in density, the package is either brought tightly against the bottom of the cup, or slightly away from the bottom of the cup to compensate for changes in densities and corresponding amount of fill. This is with a fixed height of sleeve or cup.

On rare occasions volumetric fillers are used in conjunction with weight fillers. The pre-measured volume is placed into a package, which then travels to a second device that weighs the gross weight of product and container and dribbles in the balance to bring it up to weight. This means that the least amount of materials has to be weighed out at a given time and sometimes permits use of faster machines than a straight weighing operation might permit.

There is also a type of volumetric filler where filling is done in a slight vacuum produced in the container itself. If the container is airtight, the vacuum is drawn on the container at its open end and the product filled in through the center tube to a given height. If the container is not airtight, it may be shrouded and the vacuum drawn around the entire

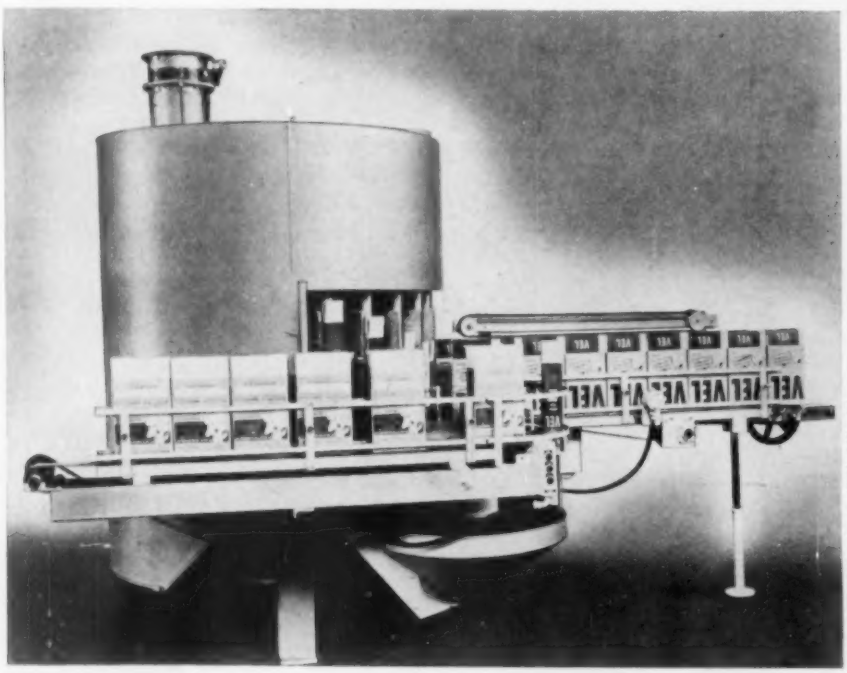


PHOTO COURTESY J. L. FERGUSON CO.

The package, which is telescoped within the measuring sleeve, forms the bottom of the measuring cup in this high-speed, rotary-type filler.

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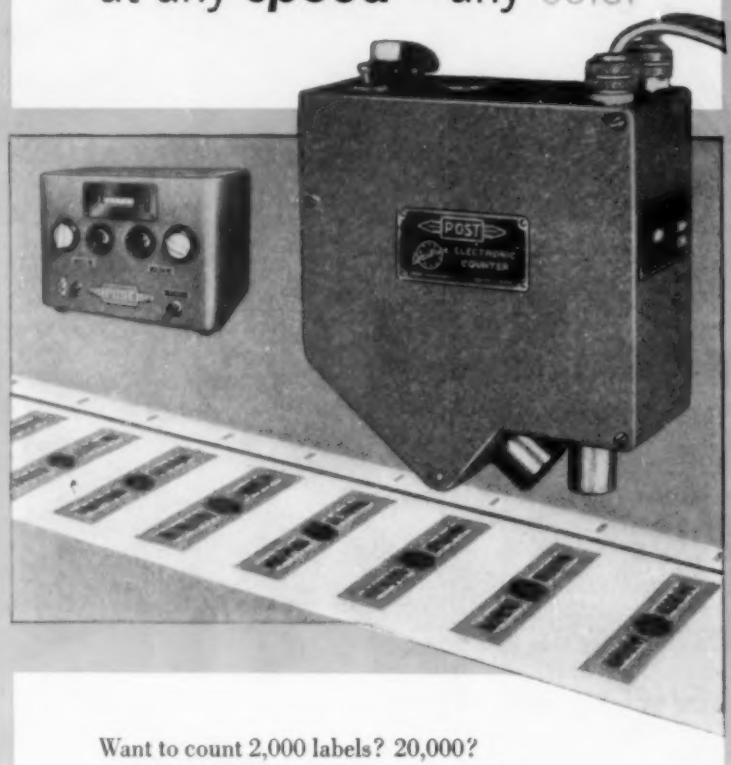
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Weighing and filling unit fills bags, cartons, cans and jars with free- and semifree-flowing products.

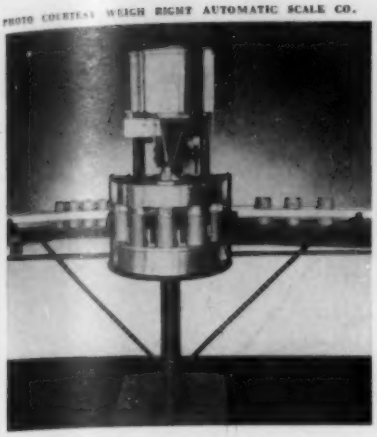
outside and inside of the container so that the filling may be done using a similar method. By varying the amount of vacuum, the tightness of the pack can be varied with natural elimination of air in the product. Again, this particular method is subject to the variation in density of the product materials and continual checks must be made in order to maintain fairly accurate filling consistent with maintenance of density.

Auger filling

The third classification of filler for dry products, called the auger filler, is built in many different styles. The simplest form is a straight auger designed to make a predetermined number of revolutions which, according to the pitch of the auger, delivers a certain amount of material into a container. This amount may or may not be accurate, depending upon the nature of the product and how it flows in an auger, and how the pitch of the auger will operate in conjunction with that particular material.

Another type of auger is called an auger packer. The container to be filled is brought beneath the auger and bottomed to the auger tube. In other words, the bottom of the auger tube touches the bottom of the container and then the auger starts to operate. The auger revolves, forcing in the material, pushing the container downward against a weighted table. When it has pushed

PHOTO COURTESY WEIGH RIGHT AUTOMATIC SCALE CO.

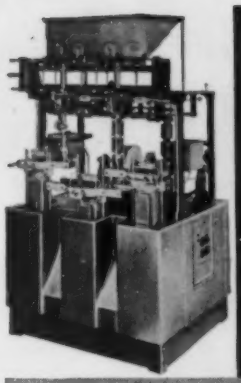


This filler for household cleansers and similar free-flowing products produces 50 units per minute.

the container down to a certain point, a switch automatically throws off the current operating the auger, the auger stops, the table is further depressed and the container removed. Another one is then put in its place. The package is filled according to height and again represents a volumetric measure accurate according to consistency of product density and sensitivity of controls. In short, this is filling to a definite level. In theory, the auger will force into the containers the same amount of material, under actually identical conditions in each case, and will bring the material up to a certain level, which should then be fairly uniform.

The auger method of filling is very often used in combination with a weight scale in a two-station piece of equipment. In the prime station, or first position, a bulk amount of material which is known to be slightly less than the required amount is augered into a container. This container is then transferred, generally automatically, from the auger filling station to a second station, which is on a weight scale. While a second package is being brought forward for the bulk fill, the first package receives a dribble for the weight check on the gross package and its contents. When the weight requirement has been satisfied, the dribble fill automatically shuts off and, if the volume fill on the first auger has been satisfied, the machine recycles.

You can easily see that by filling a container from the bottom up, which is common procedure on the auger-packer type of unit, less dusting occurs than when you drop the material from the top of the container to the bottom. This is very often the



For packaging speed and precision... **choose the sensational new ROBO-WRAP!**

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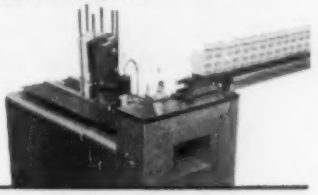
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Unitized Reverse-Tuck Cartoning Equipment

Model 54 CONVEY-O-MAT
Carton Set-up Unit



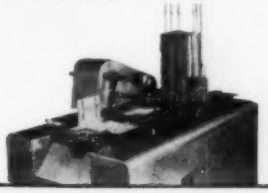
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Send us your cartons for engineering analysis.

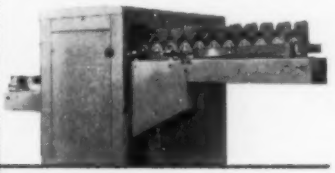
Model 50 TUCK-O-MAT
Carton Set-up Unit



Model 321 PRINTER-CODER Attachment



Model 518 CARTON-CLOSER UNIT

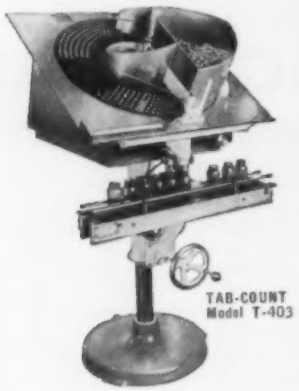


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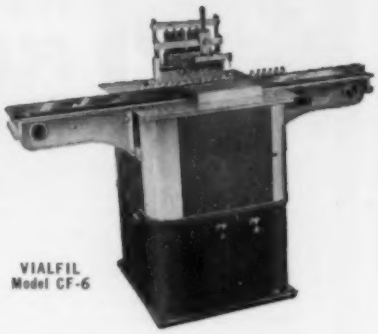


TAB-COUNT
Model T-403

The PerfeKtum Tab-Count, Model T-403 provides an automatic conveyor system for accurate high speed tablet and capsule counting and filling. Efficient, economy production up to 30 bottles of 100 count per minute, is now available to any tablet or capsule plant at a fraction of the cost of conventional automatic Tablet Counters.

For shorter runs and smaller plants, two semi-automatic Tab-Counts may better suit your requirements.

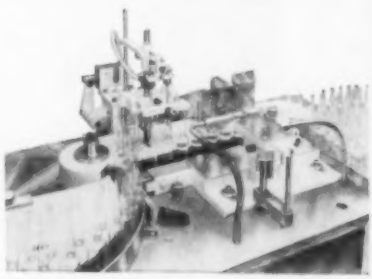
MEETING THE CHALLENGE IN LARGE SCALE ANTIBIOTIC VIAL FILLING



VIALFIL
Model CF-6

PerfeKtum Straight Line Conveyor, Multiple Head Filler, handles vials or small bottles up to six at a time from 1cc. to 20cc. or from 5cc. to 50cc. capacity. Heavy oils, suspensions and aqueous preparations all handled with equal facility. High speed, amazingly accurate liquid filler embodies many automatic features, specifically engineered for installation into a modern, straight line packaging system.

THE WORLD'S MOST VERSATILE COMBINATION MACHINE FOR VIAL AND AMPUL FILLING AND SEALING



AMPFIL-AMPSEAL
Model FPS-1

This latest engineering development in ampul filling and sealing embodies the mass handling technique, enabling the user to fill and pull seal up to 60 ampuls per minute, ranging from 1cc, to 20cc. capacity. High speed vial, bottle and tube filling are also automatically performed, including fully automatic feeding and delivery.

HERE'S HOW TO CUT YOUR STOPPERING COSTS



VIAL
STOPPERING
Model RS-100M

Up to 66 2/3% saving on packaging costs can be effected using the Model RS-100M. One attendant can now fill and stopper pharmaceutical vials with sterile solutions up to 35/min., a job previously requiring as many as three attendants. This high quality performing, compact machine is ideally suited for operation in a sterile cubicle or under a sterile hood. Ingenious, versatile design permits this production unit to stopper your complete range of vials—under sterile conditions.

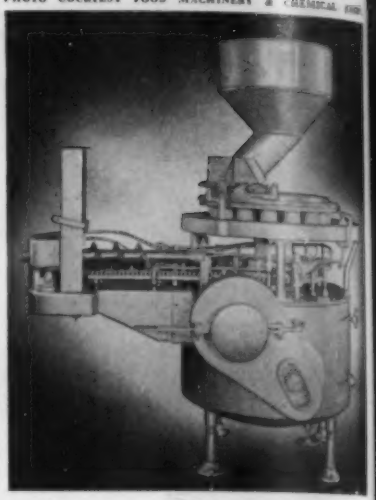
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PerfeKtum Est. 1922

POPPER & SONS, INC.

300 FOURTH AVENUE, NEW YORK 10, N. Y.

PHOTO COURTESY FOOD MACHINERY & CHEMICAL [illegible]



This filling machine for cubed and granular products is made in a number of styles for metal containers.

reason for employing the auger-packer method instead of the timed auger.

There have been many variations adopted and tried of all three types of filler—the scale, the volumetric and the auger. Varying methods have been employed of getting the material into the container: by vibration, by dropping through gravity and by handling with air, as well as by paddles and distributors.

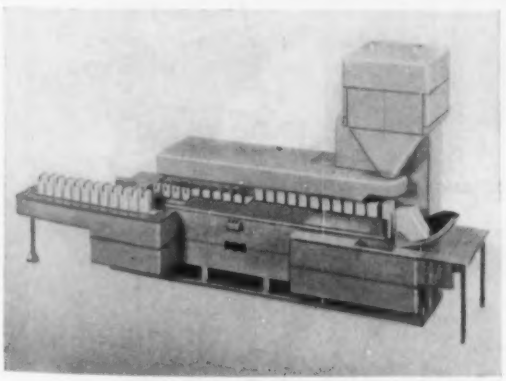
It would be difficult to outline in any article which type of equipment might be best for any product because there are so many factors entering into each situation. One must think about the type of container to be used and the size of the container opening. Consideration also must be given to the amount of floor space available in which to do the job, the speed at which the job must be done as well as the accuracy demanded, the price of the product being filled and how much leeway or variation can be permitted in the weight of packages.

Each product, each requirement, each packer's needs should be thoroughly considered by a competent engineer who is conversant with all methods available for a filling operation. What might be very good on an individual product for one plant might be out of line and too expensive for a competitor whose physical floor plan would not allow the room needed to set up a similar method, and the sacrifice of convenience in layout might result in poorly kept machinery, poor over-all efficiency and weight inaccuracies.

Discover why ARENCO machines meet your requirements BEST



Fills foods, paints, drugs, chemicals, pastes, ointments, etc. into all standard sizes of collapsible tubes and into jars, vials and cartridges from 1 cc to 220 cc.



Arenco Weighing, Packaging and Sealing Machine, Type VUV, for powdered and granular products in paper bags and cartons.

All over the globe more than 500 Arenco Fillers render unparalleled service . . . filling every type of product that may be packaged in jars, vials, cartridges or collapsible metal tubes.

High production With one operator, the Arenco fills, closes and codes up to 55 tubes per minute.

Wide product range Whether you package water-thin suspensions of antibiotics, medium viscosity creams or heavy non-flowing compounds, they all can be handled efficiently by the Arenco.

Sterile filling All parts which contact the material filled are of stainless steel or other resistant materials, and are demountable and interchangeable for sterilization.

Ease of cleaning and changeover Complete cleaning takes just twenty minutes; size changeover just fifteen minutes. Both can be done simultaneously!

Accurate filling A single pump is used for both metering and filling, insuring accuracy with all products.

Special features Automatic tube cleaning and cap tightening in one station. No container, no fill. Fat or fishtail filling of tubes. Ample passage for material. No squeezing to change consistency.

MACHINES FOR...

1. Collapsible Tube Filling and Sealing
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6. Cigarette Making
7. Sterile Cartridge Filling
8. Individual Weighing
9. Closing and Sealing Bags
10. Paper Cup Filling and Covering



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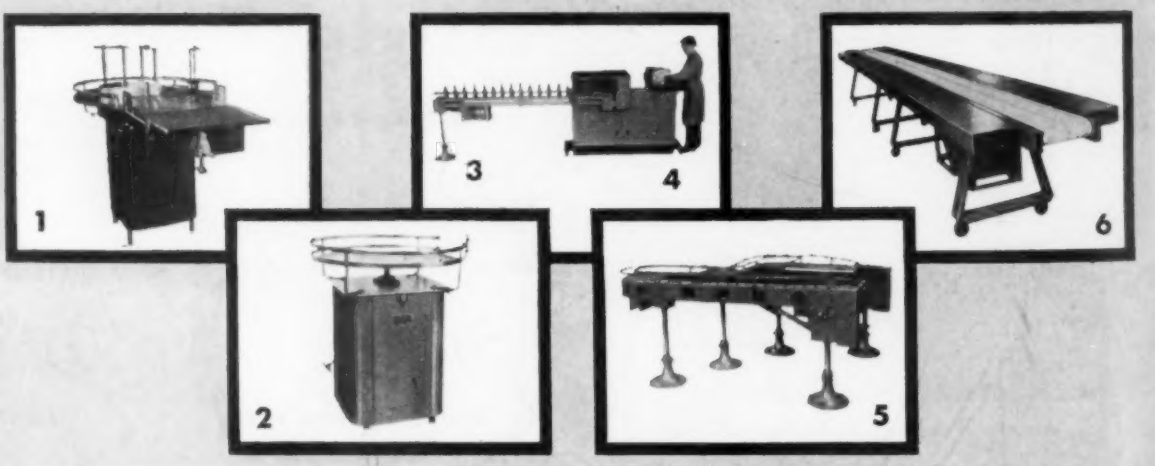
NEW! High Speed

AUTOMATIC GLASS UNLOADER & UNSCRAMBLER

PATENTS APPLIED FOR



The Styl-O-Vac Automatic Carton Unloader is self-timed by the cartons themselves with vacuum opening the flaps, lifting and depositing container onto the Styl-O-Matic Walkie Pushie unscrambler where they are discharged in single line to filler. It is entirely automatic and completely adjustable for most standard sizes in less than 5 minutes. Write for Bulletins SV-1 and WP-2.

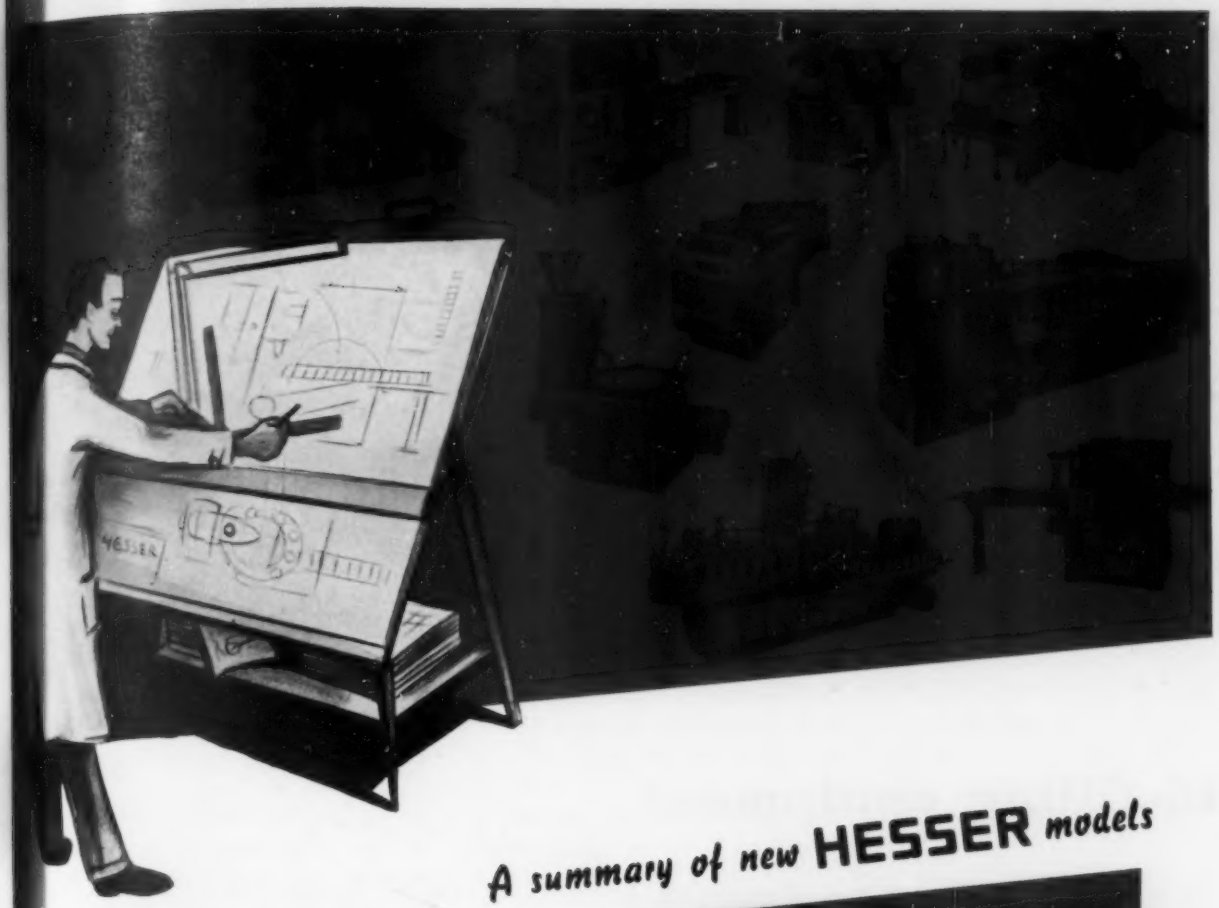


1. STYL-O-MATIC ROTARY UNSCRAMBLING TABLE. Automatically regiments round bottles, cans, all kinds of vials, etc. *Bulletins ST-1*
2. STYL-O-MATIC ROTARY ACCUMULATING TABLE. Parks excess units when feed is excessive. *Bulletin ST-1*
3. STYL-O-MATIC BOTTLE, JAR, CAN AND CONTAINER CONVEYOR. A smooth, flexible system. *Bulletin ST-1*
4. STRAIGHTLINE UNSCRAMBLER. Automatically regiments bottles, jars, etc. of all shapes and sizes. *Bulletin ST-1*
5. STYL-O-MATIC LATERAL CURVE BOTTLE, JAR, CAN AND CONTAINER CONVEYOR. Conveys at angles without corner brackets or extra power units. *Bulletin ST-1*
6. UNITIZED CONVEYOR TABLE. AN ALL PURPOSE CONVEYOR. For assembly, for inspection, for packaging. *Bulletin UC-1*

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A summary of new **HESSER** *models*



Many other standard machines have been perfectioned and equipped with new devices (roll feed with electric eye, handling of heatsealing materials, papers and foils, new coupon inserters, bud loaders, combined weighers and augers etc.).

Ask for more!

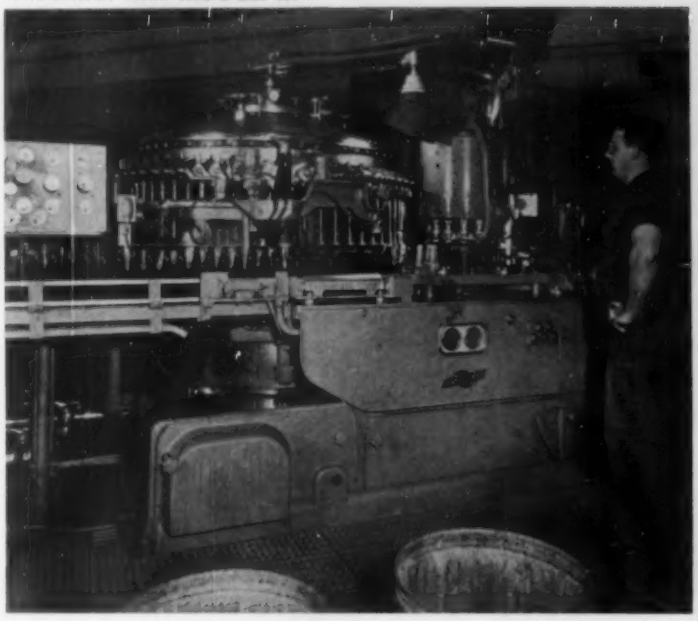
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PHOTO COURTESY CROWN CORK & SEAL CO.



New design filling and capping machine has a 60-spout rotary filler that can turn out 380 bottles a minute.

PHOTO COURTESY U. S. BOTTLERS MACHINERY CO.



Battery of automatic vacuum fillers is used in the plant of the Simoniz Co., Kankakee, Ill.

Liquid-filling equipment

by D. W. TIANO*

The selection of a liquid filler is dependent on three main factors: (1) characteristics of the product; (2) size, type and shape of container, and (3) the production rate desired.

Five different principles are employed for the filling of liquids. These include: straight gravity filling, pressure-gravity, straight vacuum filling, vacuum-gravity and pressure-vacuum.

Straight gravity filling is an accepted method for filling extremely foamy products. A material that foams excessively during the filling process, as most shampoos do, is not well suited to handling on most vacuum-type fillers. Semi-automatic as well as fully automatic liquid gravity fillers are available. Regardless of type or make, the principle employed is generally the same. From an overhead storage tank the product is allowed to flow by gravity through a filling head. The bottle, which is sealed by the filling head, must vent the air contained within it before product flow can begin. To provide an outlet for this air within the container, a vent pipe is used which permits the entrapped air to escape as the liquid fills the container. To accomplish a uniform fill, an overflow is permitted through the spillway provided and this overflow from each filling cycle is carried off to a collecting tank.

Also well adapted to gravity-type filling are those materials which tend to separate or go out of emulsion when handled by vacuum-filling methods. In this category are many liquid hand creams and lotions. Prolonged and careful tests with vacuum on these products resulted in separation of the various ingredients. Thus, filled containers became unsightly.

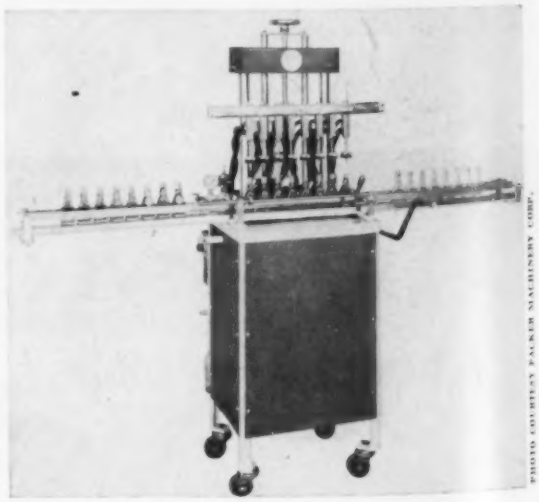
These liquid creams and lotions are

* Manager, Bottling Div., Pneumatic Scale Corp., Ltd., Quincy, Mass.

PHOTO COURTESY TRIANGLE PACKAGE MACHINERY CO.



Pre-measuring filler designed for short-run production opens, fills, code dates and closes paper milk containers.



Vacuum liquid filler, straight-line, semi-automatic. Compact portable machine.

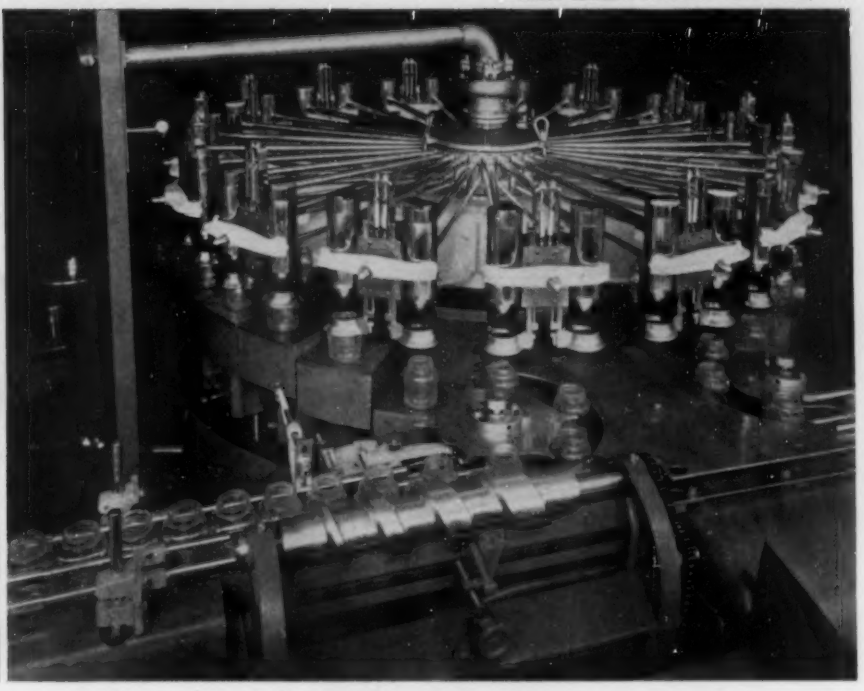
PHOTO COURTESY PACKER MACHINERY CORP.

PHOTO COURTESY ARTHUR COLTON CO.



Six-spout automatic filler for bottles, jars, cans fills up to 480 a minute.

PHOTO COURTESY PNEUMATIC SCALE CORP., LTD.



Rotary liquid filler used for both light and heavy liquids is capable of filling speeds up to 250 containers per minute.

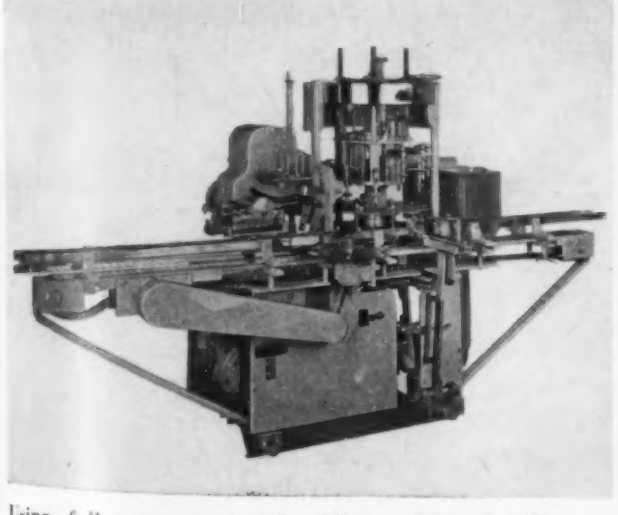
generally so viscous that in order to attain proper fill speed on a gravity filler, a positive-displacement booster pump is necessary. Such an arrangement constitutes the *pressure-gravity system*. The booster pump is located between the overhead main storage tank and the inlet at the top of the gravity-filling machine. This positive-displacement pump, and there are several types available, is capable of producing pressures up to 20 lb. per square inch, which permits a great increase of the "static head" and much higher fill speeds than can be obtained with a straight gravity type of filler. On viscous products, as with foamy products handled on a straight gravity filler, there is a balance between the amount of pressure that can be used and the amount of additional foaming which may result. This balance is determined for each product experimentally. For each product there is an optimum pump pressure or static-head pressure that can be employed either on a straight gravity or pressure-gravity filler.

Gravity filling is also adaptable in the filling of semirigid or light-walled containers where the use of heavy vacuum would cause partial or complete collapse. Included are the newly developed polyethylene bottles as well as light-gauge, rectangular-section metal cans ranging up to ½ gal. (U.S. measure) in capacity. Vacuum fillers, of course, can be used for these containers, but a light vacuum must be carefully maintained and speed is affected accordingly. Speed, however, is only one determining factor.

The greatest number of liquid fillers in actual use and sold day by day are of the *straight vacuum type*. The air is exhausted from the sealed container through a vacuum connection

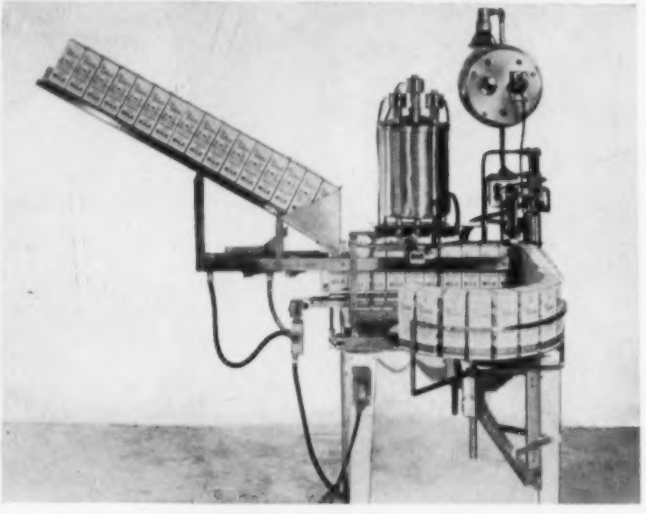
(*This article continued on page 408*)

PHOTO COURTESY BINER-ELLISON MACHINERY CO.



Using full vacuum-principle fill, machine handles bottles from 1 oz. to 1 gal. at rate of 60 per minute.

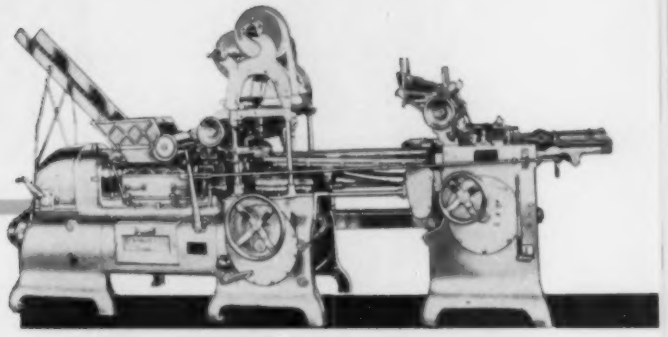
PHOTO COURTESY THE MOJONNIER DAWSON CO.



Fully automatic filler for paper milk cartons fills 30 qts. a minute. Also fills other free-flowing liquids.

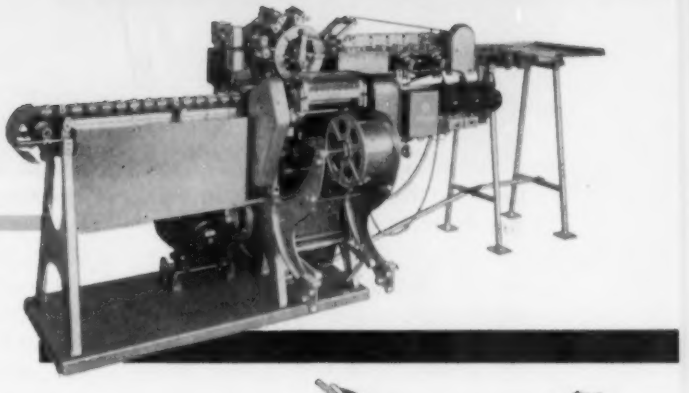
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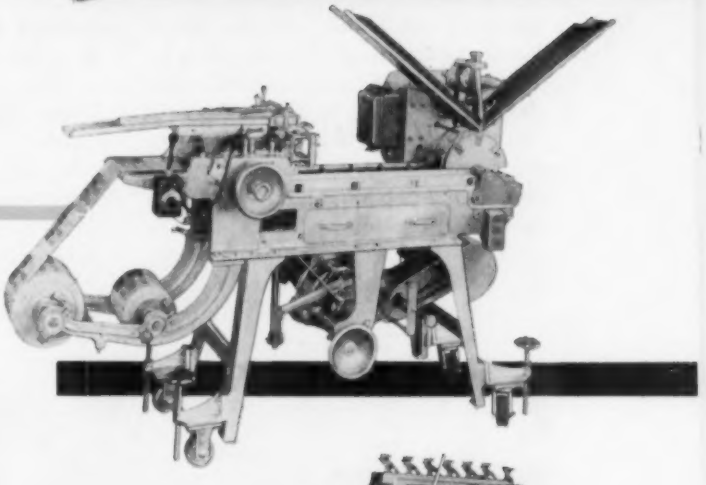
THE LYNCH MODEL T&K

automatically molds, wraps and cartons butter and oleomargarine. Neater, more attractive prints produced at higher speeds—with controlled weights. Lower manpower requirements cut production costs.



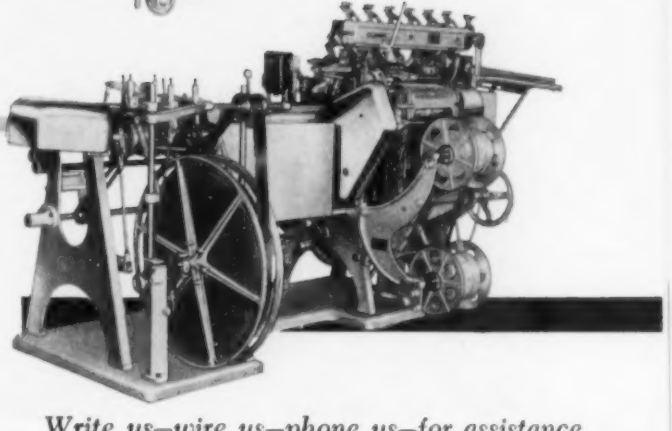
THE LYNCH MODEL RS

precision wraps round or square cookie or cracker sandwiches in more attractive, faster selling packages. New design features provide for 100 multiple unit packages per minute, with minimum scrap loss.



THE LYNCH MODEL SMW

economically makes, wraps, seals perfectly formed ice cream sandwiches direct from the freezer. Lynch engineering design results in less waste, lowered production costs, thus assuring greater profits.



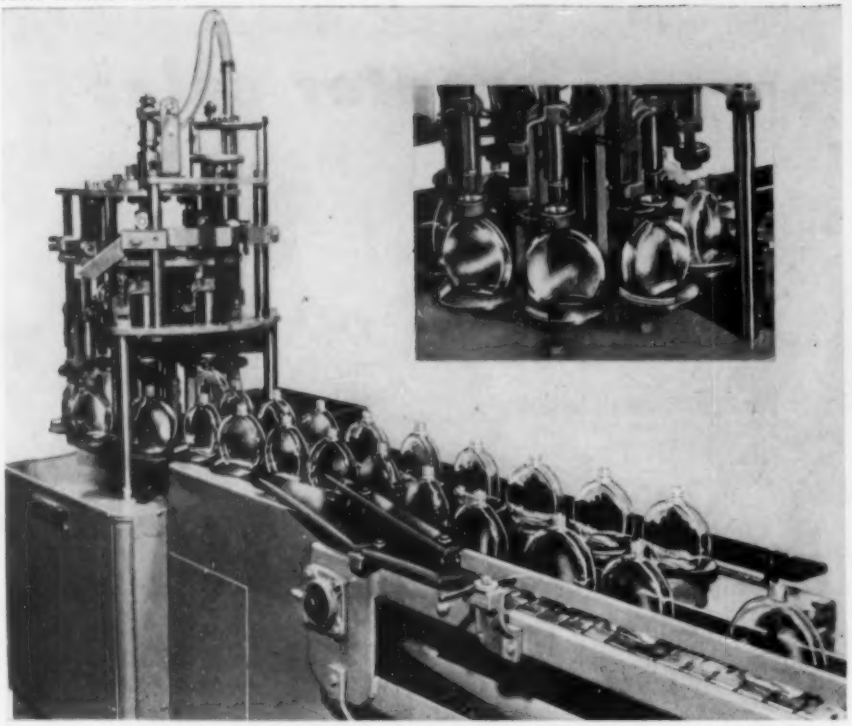
THE LYNCH MODEL PB

efficiently wraps fragile, irregular or standard shaped items for the confectionery, bakery, novelty and allied industries. Loads direct from product trays, minimizes scrap loss. Requires only two operators.

Write us—wire us—phone us—for assistance in solving your packaging problem.

LYNCH CORPORATION • *Packaging Machines* • *Anderson, Indiana*

PHOTO COURTESY MRM CO.



Universal feeding arrangement makes it possible for this machine to handle any shape or size of container without changing feed set up.

and the liquid is drawn up from a supply-tank source at the machine. Containers are filled to a predetermined level indicated as the "filling point on the bottle." At this point, liquid is carried up through the vacuum connection to a manifold. After the seal is broken, liquid is returned, either by gravity flow or by positive-displacement-pump action, to the machine supply tank. The straight-vacuum-fill principle is adaptable to products ranging from alcoholic preparations of light viscosity to heavy glues.

Many types of vacuum liquid fillers are available ranging from two-spout hand fillers to multihead, high-speed rotary fillers capable of 400-per-minute production. Straight-line as well as fully automatic rotary types are manufactured by several companies.

There are perhaps as many different types of vacuum liquid-filling nozzles as there are machine companies engaged in the manufacture of these machines. A great many of these vacuum-filling machines employ filling heads or nozzles or "stems" where a check ball or gasketed seat is an essential part of the fill-nozzle construction. These types of fill nozzles usually require careful maintenance to prevent serious dripping.

There is another type of vacuum-filling nozzle where dripping is impossible through the life of the machine, since there are no check balls, valve seats or gaskets which require maintenance and replacement.

On all vacuum fillers, the machine tank or liquid-supply reservoir is located below the level of the bottle base and the liquid consequently must be "drawn up." The overflow is carried through headers, or hoses, to a common manifold. Generally this overflow is drained back by gravity to the filling-machine supply tank.

In other models, particularly the rotary machines which are multihead vacuum fillers, a pump, usually of the positive-displacement type, is employed to handle overflow. The overflow is either pumped back into the machine supply tank or to the main supply, most frequently located overhead. In some cases, where specifications are exacting, the product is returned to the processing room.

The vacuum-fill principle, which requires sealing and evacuation of the air within the container, automatically rejects a cracked or broken bottle, since the vacuum needed to fill the container cannot be produced. This permits quick detection by the inspector, who almost always supervises the automatic bottling line.

Vacuum filling, head for head, produces the fastest fill, as compared with gravity or pressure-gravity systems. It is the only system that permits the filling of restricted-opening or all-glass sprinkler-top containers. It is impractical to consider a scale-down, small-diameter gravity type of filling nozzle for use with this type of container.

There are several types of *vacuum-gravity fillers,* which are employed for free-flowing products, and they are widely used in certain fields. In the liquor industry they are highly regarded because they operate at a minimum of vapor or spirit loss. It is true, however, that in the handling of alcoholic spirits, such as whisky, over-all losses from all causes on a spirit-liquid filler are a combination of vapor losses plus drip plus spillage. This places a premium on proper operation and maintenance as well as on the selection of equipment that is easy to maintain. There are, of course, high-speed gravity-vacuum fillers on

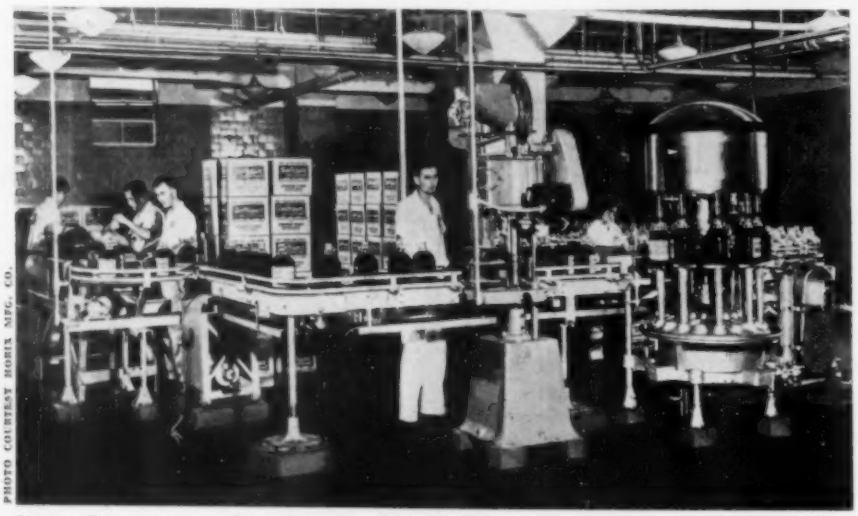


PHOTO COURTESY HORIX MFG. CO.

Nine-valve rotary gallon-filling unit installed in line with unscrambler, conveyor and rotary accumulating table provides filling which is fast, efficient.

the market that are noted for the little maintenance they require.

Pressure-vacuum fillers are an adaptation of the straight vacuum machine with the pressure feeder added to "boost" the speed of fill, particularly with heavy or viscous liquid products. The pressure-vacuum machine is generally more expensive than the straight vacuum machine, since additional equipment is required to produce the added pressure. This added cost can be justified, however, where the additional production possible with the pressure booster is needed.

Special types

Siphon fillers are perhaps the most elementary and lowest priced of all liquid fillers. In the main, they consist simply of a stand, an open-top tank and a series of siphon spouts reaching from the tank out over a table or plate, where an operator inserts the bottles manually onto each head. In the process of insertion, the valve opens, allowing the liquid to flow by gravity into the container which, when filled, the operator "strips" or removes from the siphon-filling stem for capping.

Measure fillers and weight fillers. Another special type of filler is a machine filler which weighs or measures the product filled. These units are specially suited to the filling of very expensive liquids like perfumes or products like antibiotics in liquid form which require absolute accuracy.

Usually these machines are special-purpose equipment and, particularly those developed for pharmaceutical houses, are "home made." In general, they operate at slow speeds.

Methods of handling

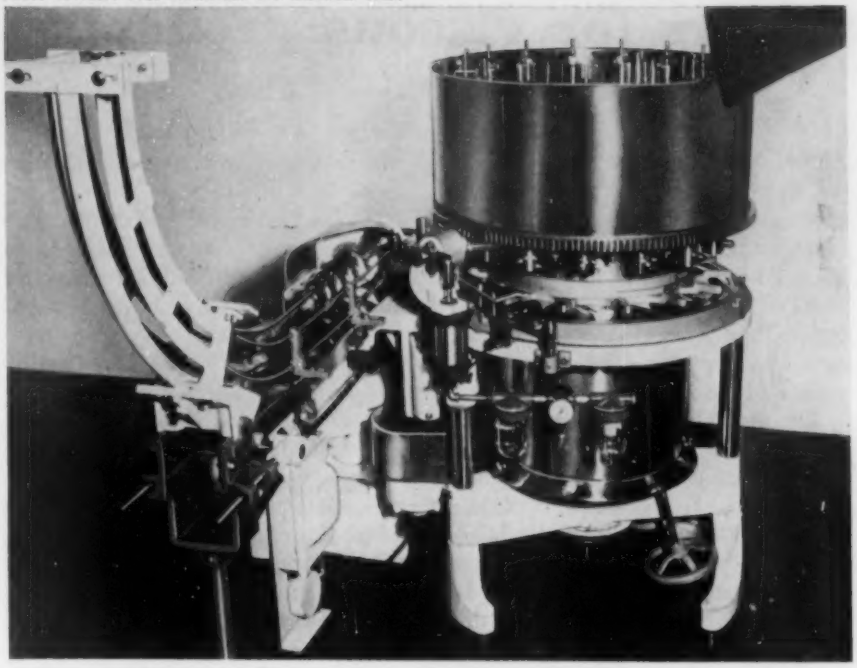
Container proportions are a determining factor in the selection of a liquid filler. The machine best suited to the handling of ½-oz. extract bottles is not well suited to the handling of round gallon-size jugs. Container shape will also affect the selection of a proper liquid filler. In the cosmetic field, many containers have been carefully designed for the utmost in eye appeal, but the artist may have given inadequate thought to the production man's problems in handling such a container at high bottling speeds—for example, a vase-shaped container having a base much smaller than the shoulder width or diameter.

It is impossible for a line of such unstable containers to "collect" on a conveyor prior to entry into a filling machine. Special provision, therefore, must be made for the effective conveying of containers that are unstable. These can be successfully handled on synchro-driven conveyors and by close-coupled installations.

The *synchronized conveyor line* together with the cleaning, filling and capping machinery it serves are powered from a common source. When this type of conveyor is equipped with spaced centers, unstable containers cannot "fan out."

The *close-coupled installation* combines air cleaning, liquid filling and screw capping into an integrated operation in which transfer from step to step is done by means of positive timing stars or dials. Each container thus receives individual handling and travel distance is held to a minimum. The close-coupled installation operates, in effect, as a single machine.

PHOTO COURTESY FOOD MACHINERY AND CHEMICAL CORP.



Suited to filling liquids and liquids with suspended solids, filler operates at speeds up to 325 can a minute with 15 valves that uniformly pre-measure the liquid going into jars or cans. Has no can—no fill lever.

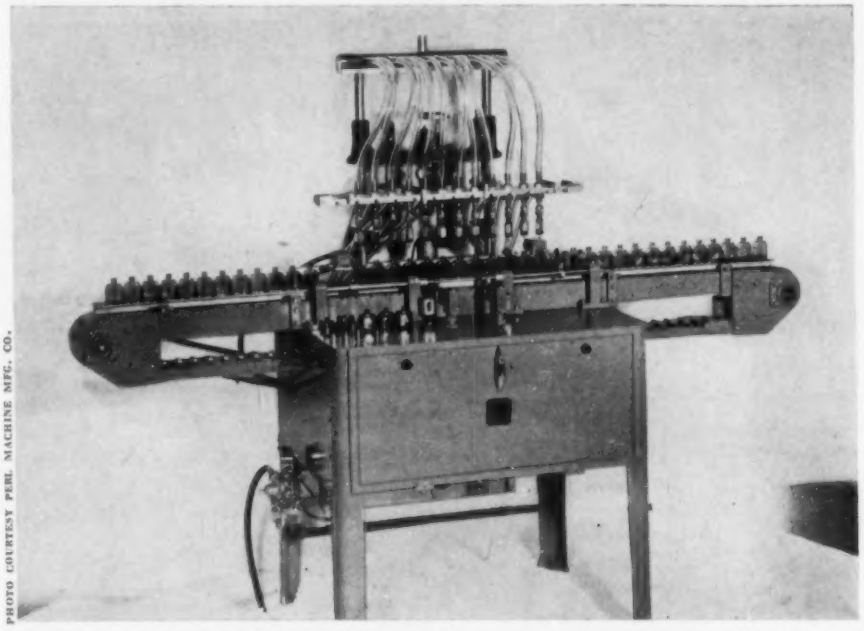


PHOTO COURTESY PERL MACHINE MFG. CO.

High-speed straight-line filler for wide range of cans and bottle sizes, at speeds up to 180 containers per minute. Models available in four size ranges.

Fillers for viscous products

by W. D. PHETEPLACE*

The products that are not free flowing and are of a heavy or viscous nature require a positive-displacement-type filling machine. While we think of a positive filler mainly in connection with heavy products, many lighter and more free-flowing products can also be filled successfully with a piston filler.

The piston-type filler is logically indicated when products such as peanut butter, potted meat, cheese spreads, mustard, pastes, creams, polishes, paints and the like are to be filled. Positive-displacement-type fillers are also used successfully for thin oils, syrups and similar products, and this type filler has become quite important in the filling of aerosols, where accuracy of fill is imperative.

Piston fillers, of most designs, deliver a metered quantity of product to a container and because of their positive-displacement action are generally far more accurate than other types of fillers.

Very often a heavy product represents a concentrate and losses from over-fill or by spilling, even small amounts, can become a sizable item in a day's operation.

Today, more and more companies are applying statistical methods to production control and in many plants the accuracy of fill pattern is checked as frequently as every half hour. These methods of production control and analysis are a challenge to manufacturers of filling equipment and are a stimulus to design improvement.

There are three basic types of positive fillers and these are: (1) straight line; (2) rotary piston; (3) pocket-type, rotary-piston fillers.

The straight-line filler is quite versatile in application and widely used in industry. It is available in single- and multiple-cylinder models. The cylinders are usually mounted in a horizontal position, directly connected to the filler valve and located under the filling tank or feed hopper, with the pistons operating on a horizontal plane. The pistons, cylinders and valve assemblies are easily accessible for thorough cleaning.

The containers are fed through in a straight line and are automatically centered under the filling nozzle. Usually, the containers are momentarily stopped while the fill is made.

The piston draws a measured amount of material into the cylinder from the supply above, gravity helping in some cases, and then the piston discharges the product on the reverse stroke, through a nozzle into the container. The container, or row of containers, is moved along and the next empty container or group is centered into place and filled.

Cylinders of different diameters are available and the size selected by the filler manufacturer will depend upon the physical nature of the product, the container size range, speed required and the accuracy expected.

Not only does the cylinder size have an effect on the type of fill, but the size of the valve inlet port in the discharge nozzle also enters into the picture. The selection of the discharge nozzle is of greatest importance and the design will vary with the product and type of container.

All straight-line fillers are adjustable through a specified filling range and for a container size, within the design limits.

Each piston is adjustable for accuracy of product delivery, by changing the stroke. It should be remembered that small-diameter cylinders and pistons, usually with a long stroke, give greater accuracy than a large cylinder with a shorter stroke. A large cylinder should not be used for filling small containers.

Proper cylinders and pistons will be specified by the filler manufacturer for a given range of products and container sizes, if he is supplied with full information as outlined in this article.

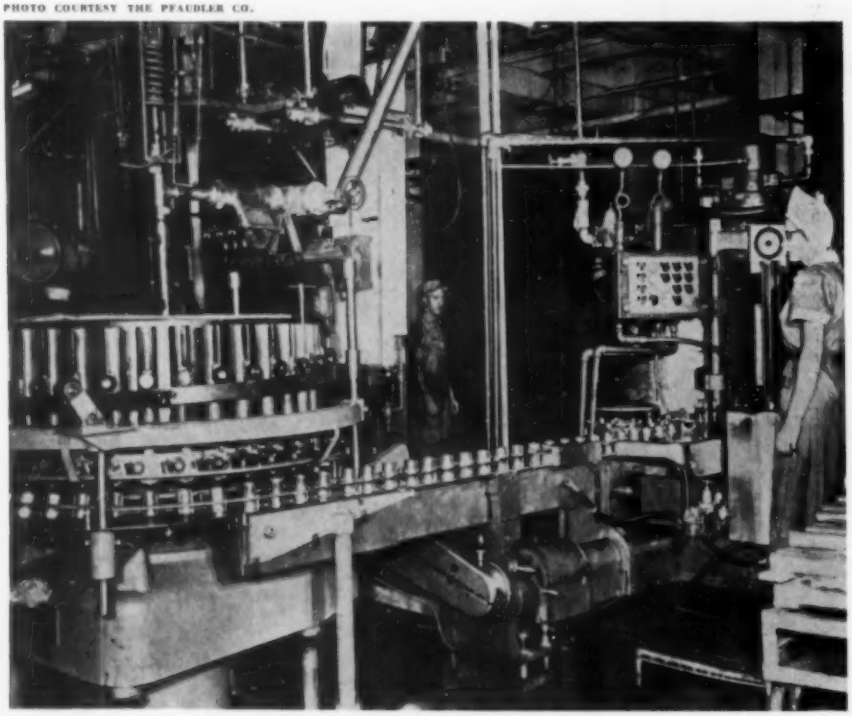
Straight-line filler hoppers are available with heating coils or jackets, when the product must be kept warm enough to have fluidity. Hoppers equipped with various styles of agitators or mixers are also available to assure good solids distribution during the fill of the cylinder prior to delivery to the container.

Some products require a bottom fill to eliminate air pockets and the straight-line fillers are available with a rising table to accomplish this.

As the centered container rises, the filling nozzle reaches nearly to the

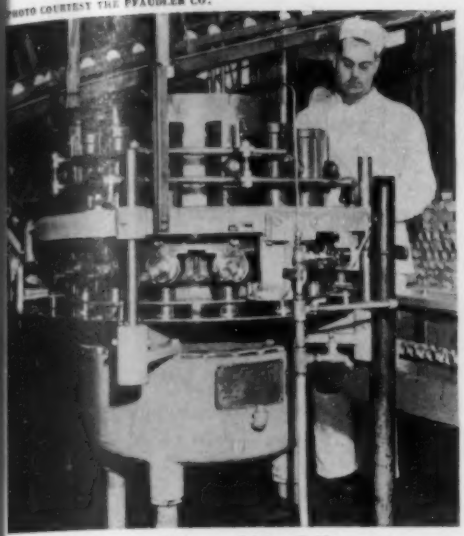
* The Pfaudler Co., Rochester, N. Y.

PHOTO COURTESY THE PFAUDLER CO.



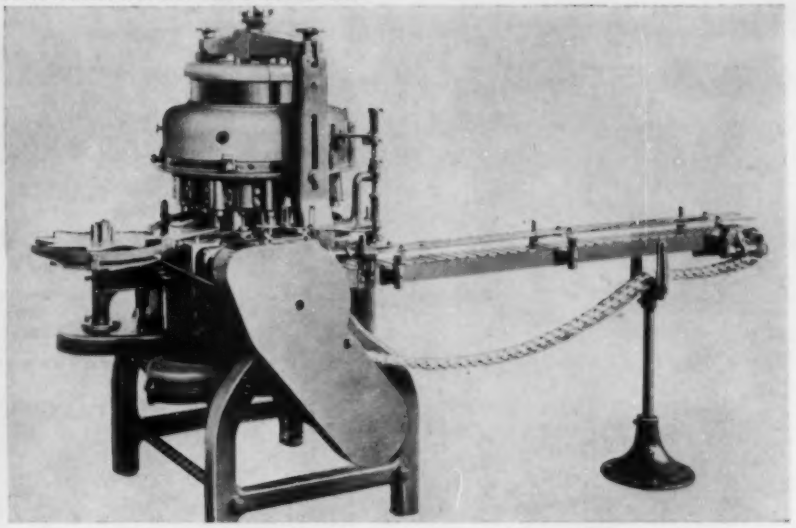
This rotary-piston filler is being used to fill cans of baby food at speeds of 650 a minute. Speeds of more than 1,000 a minute have been obtained.

PHOTO COURTESY THE PFAUDLER CO.



Piston filler packing 290 1-lb. cans per minute of Hershey chocolate syrup.

PHOTO COURTESY FOOD MACHINERY & CHEMICAL CORP.



New model rotary 10-pocket plunger filler fills liquids, semi-liquids and heavy solids. Speeds, up to 300 units per minute.

bottom of the container and the container is filled as it is gradually lowered. At the return of the lifter to the feed table, the filled container is pushed or otherwise moved ahead and is replaced by an empty container.

There are many modifications in straight-line fillers available for foods, cosmetics and pharmaceuticals.

Rotary-piston fillers operate on the same general principle as the straight-line filler, but the cylinders, valves and pistons are located in a vertical position around the filling tank and the whole tank assembly rotates with the container. The number of cylinders used is determined by the production requirements.

Containers are fed into the filling machine by means of a feed star or by a worm feed. A screw-type feed is particularly necessary for high-speed operation.

The containers fed into the filler are centered under each filler valve nozzle and they remain in this position until the filling cycle is completed and the container is discharged to the closing machine.

The product to be filled is drawn into the cylinder, the amount being precisely determined by the stroke, and then discharged through the filler valve into the container.

These fillers are available with various sizes of cylinders, the size depending upon the product to be filled and the accuracy expected. Filling nozzles are usually fitted to the valve and discharge port to direct the flow into the container. The diameter and design of the discharge nozzle depend upon the type of product that is to be filled.

Modern rotary-piston-filler design takes full cognizance of the importance of ease of cleaning. Pistons, cylinders, valves and filler tanks should be easily accessible for thorough cleaning between different products and at the end of the day's operation.

Bottom-fill arrangement is also available on some models of rotary-piston fillers, where the production speed allows and the product requires this type of filling procedure.

Rotary-piston fillers are definitely indicated for high-speed production but are also used to advantage for slower output.

Where a rotary-piston filler is used for slower speeds, a nonintermittent type of filling operation should be used. Filling speeds from 40 to 800 containers per minute are commonly available and speeds up to 1,000 per minute have been obtained.

The success of high-speed filler operation is dependent upon the precise timing of the container at the infeed and discharge points of the filler. Close coupling in the filler and the closing unit is very desirable and should be made wherever possible.

At high speeds through the filler, careful consideration has to be given to the effect of centrifugal force on the filling stream and container. This force is quite negligible at low speeds but extremely important from 500 to 1,000 containers per minute.

Open-pocket-type rotary fillers are available for a wide range of products. In this design, the cylinders are

PHOTO COURTESY ARENCO MACHINE CO., INC.

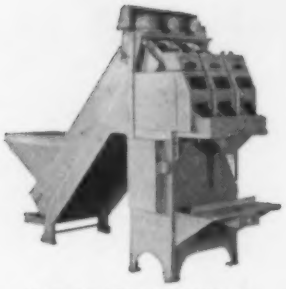


Viscous filler handles jars, bottles or cans, 1 to 250 cc. in volume. Measuring fill can be adjusted to container size.

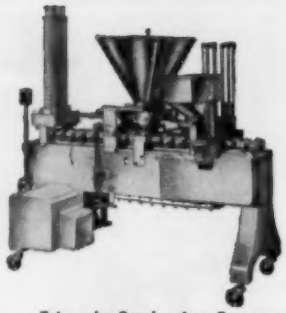
PHOTO COURTESY ELGIN MFG. CO.



Twin filler handles glass jars, cans or paperboard containers at speeds from 1,800 to 3,000 per hour.



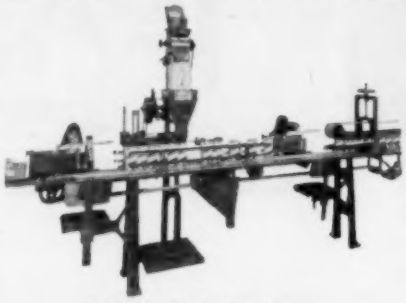
Triangle ELEC-TRI-PAK reduces costs up to 60%!



Triangle Bagby Ice Cream Filler cuts costs in half!



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mounted vertically underneath the filler supply tank.

From the supply tank, the product is fed down into the cylinders. The rotation in the cylinders under a stationary cut-off plate opens and closes the tops of the cylinders. When the measuring cylinder is filled and closed from above, the piston, mounted on each cylinder and actuated by a cam plate below, rises to push the measured product through a side discharge opening. A supplementary small reciprocating piston operating in the unit serves as the final cutoff and clears the nozzle of the product into the container underneath. Provision can be made at the nozzle bottom to prevent the formation of strings and to cut down adhesion of product.

The selection of a correct positive-type filler for a given product and set of conditions requires cooperation between the buyer and the filling-machine manufacturer. Full information should be furnished so that all product peculiarities are known.

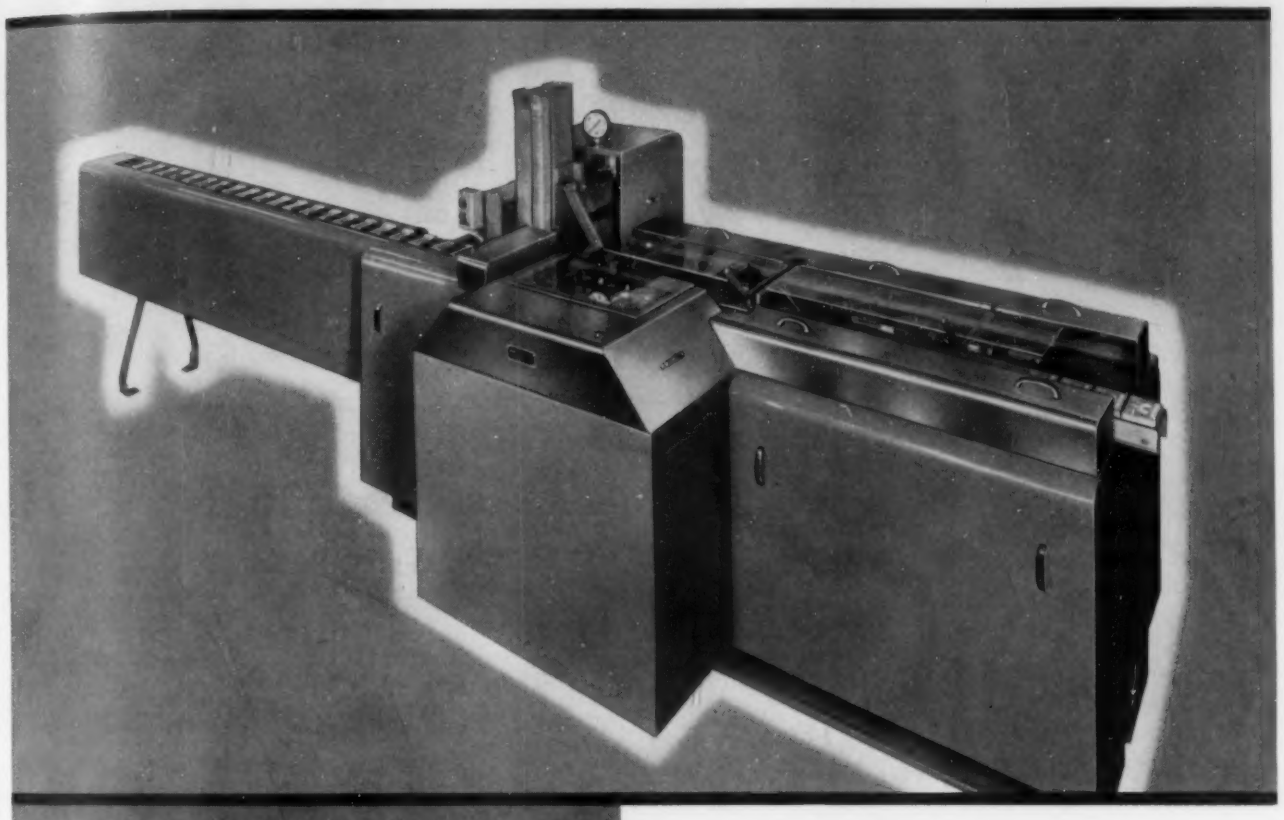
The following information should be furnished to the supplier:

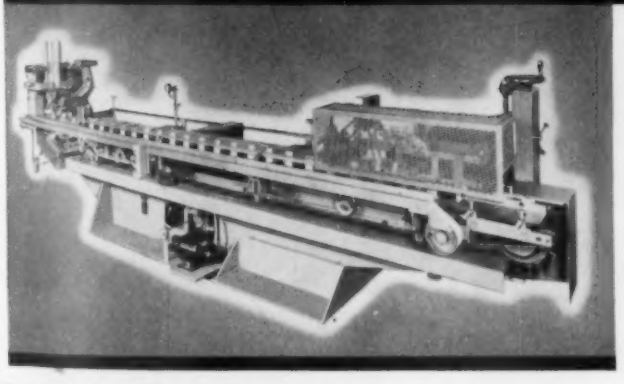
1. Name of product
2. Nature of product
   (a) Free flowing
   (b) Viscous
   (c) Solids—give particle size
   (d) Tendency to foam
   (e) Tendency to string out
3. Filling temperature
4. Container size
5. Container material
   (a) Metal
   (b) Glass
   (c) Plastic
6. Fill wanted
   (a) Weight
   (b) Volume
   (c) Head space
   (d) Accuracy
7. Speed of fill required—containers per minute
8. Is product corrosive and/or abrasive
9. Closing machine
   (a) Make
   (b) Model number
10. For rotary fillers, should the container discharge be clockwise or counterclockwise.

Answers to the first eight questions will assure a better filler application for a specific purpose. The data on the closing machine will contribute to an operation with a smooth take-off or transference from filler to closer—an important item often neglected.

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REDINGTON machines are designed with one primary idea in mind—to help you reduce operating costs while getting better packaging. Their basic principles—and many ingenious special modifications—have been proved out during nearly six decades of experience in solving packaging problems in almost every field. Many smaller operations—as well as "big name" plants—are profiting with REDINGTON Automatic Packaging. Why not investigate —now—what REDINGTONS can do for *you?*





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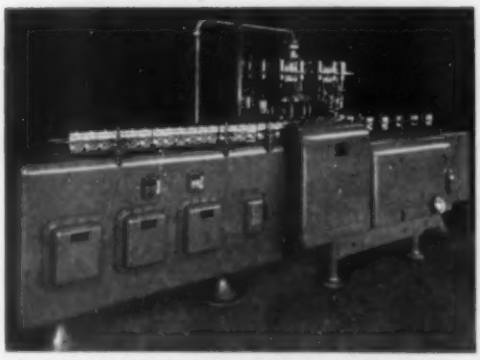
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PNEUMATIC BOTTLING MACHINERY

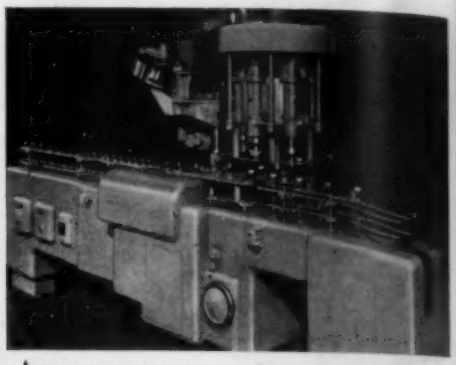
Precision built equipment for cleaning, filling, capping and labeling a wide range of bottles, cans or jars. All units may be operated individually or in series with other machines to form a complete production line.



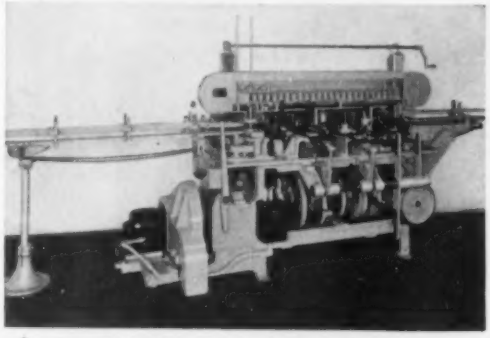
ROTOVAC-18 FILLER — Rotary vacuum type machine employing an exclusive fill principle which permits accurate control of filling heights without drip or sputter. Handles wide range of sizes at speeds up to 180 per minute. May be used as 9-head unit for filling standard gallon jugs.



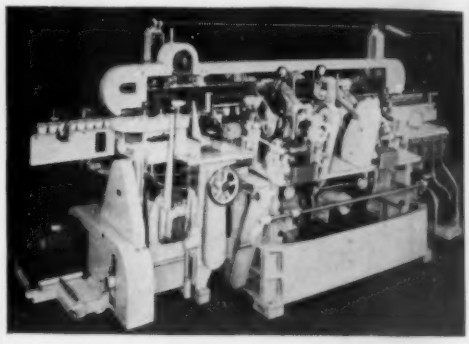
SEMI-AUTOMATIC AIR CLEANER — Two head unit for cleaning wide range of containers at 20 to 50 per minute. Attendant inverts two bottles at a time by thrusting necks into self centering nozzles, when seal is made, a blast of air is released into the bottles to loosen dust and other foreign particles.



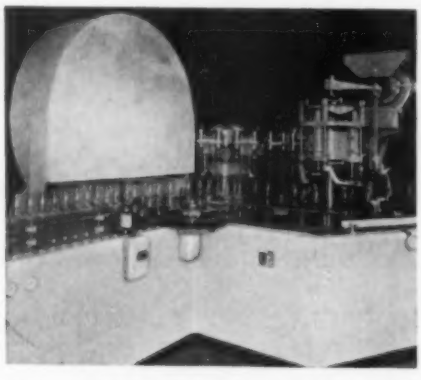
PNEUMACAP-SIX — A high speed rotary capping machine equipped with Sterling cap feeder and gripping air chucks. Selective built-in four-speed chuck drive permits choice of exact speed required for best handling of various closures. Machine available in 4, 6 and 8 head models with speeds ranging to 240 or more container per minute.



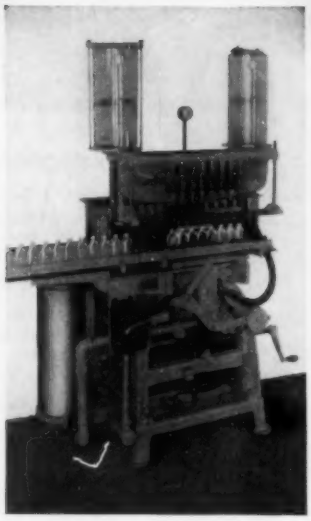
4" McDONALD TYPE SIMPLEX LABELER — for automatic application of front only or both front and back labels at speeds of 60 to 80 per minute. Especially well adapted to smaller sized containers.



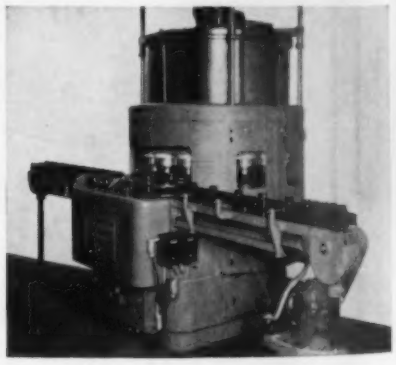
4" DUPLEX DIREC-TRANSFER LABELER — Designed for precision label application. Label is transferred direct from stack to container. Applies both front and back labels at speeds ranging up to 120 per minute.



CLOSE-COUPLED BOTTLING LINE — Automatic synchronized combination for air cleaning, filling and capping 2 ounce up to 1 quart sizes at speeds upwards of 120 per minute. Rotavac-30 Filler as well as cleaner and capper are available as separate units if desired.



SAMCO JR. VACUUM FILLER — Semi-automatic machine for handling filling requirements calling for short runs on a variety of products and container sizes. Free-flowing or semi-free flowing liquids in 1 ounce to 1 gallon bottles or cans may be filled at speeds ranging up to 40 per minute.



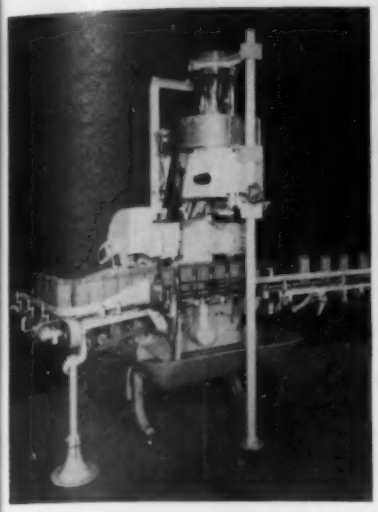
VACUFLOW ROTARY MODEL — Designed for high speed vacuum filling of practically any type non-freeflowing powder and many freeflowing materials. One of three models is available to handle boxes, cans or jars up to 7½" in diameter and 9½" high. Speeds range from 45 to 300 per minute.

PNEUMATIC

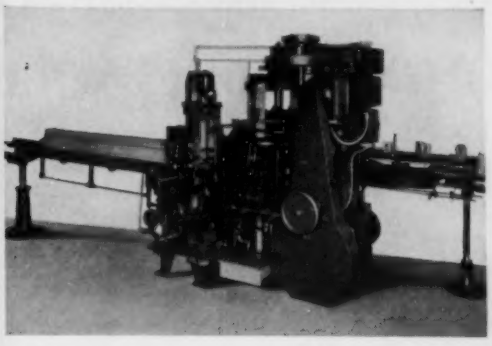
Packaging and Bottling Equipment

PNEUMATIC PACKAGING MACHINERY

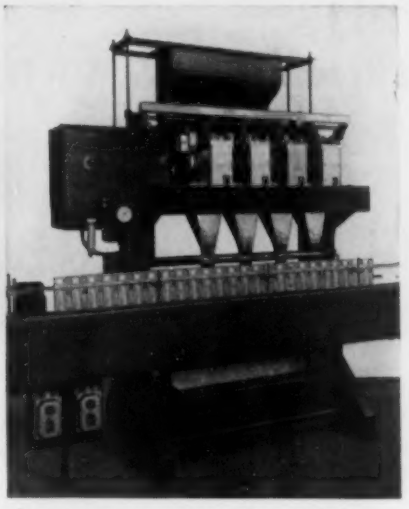
Complete hook-ups for packaging at "Lower Cost per Container". Bottom Sealers — Lining Machines — Net and Gross Weighers — Top Closure Units — Tight Wrapping Machines — Double Package Makers — Heat Seal Packet Makers — Vacuflow Powder Fillers — Bag Flour Packers



GROSS WEIGHT WEIGHER — Two head machine for weighing prepared flours and various mixes with shortening content such as cake or biscuit mix. Conical supply feed provides constant head of material to insure a close tolerance in weights.



CARTON FEEDER AND BOTTOM SEALER — One of several models designed for feeding, forming and bottom sealing or tucking cartons at speeds ranging up to 105 per minute. All units are adjustable for different carton sizes.

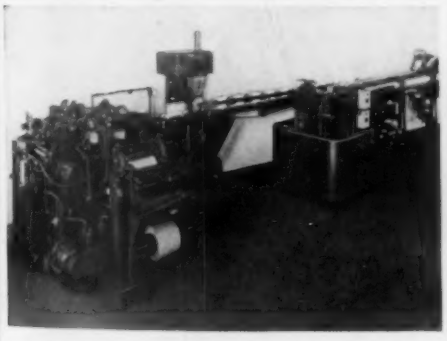


4-HEAD PNEUMATRON WEIGHER — The most practical approach to instantaneous pressure weighing. Pneumatron heads are made up of cantilever assemblies and air jet control devices which measure receptacle deflection in millionths of an inch while weighing within hundredths of an ounce. Available in two and four head models with speeds ranging up to 130 per minute.

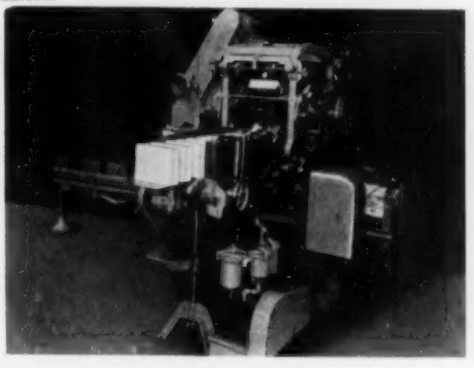
DUSTLESS VACUFLOW POWDER FILLER, MODEL D — This single head machine is designed for economic powder filling operations. The Vacuflow filling principle is based on vacuum feeding instead of pressure — a method which eliminates dust because it does not involve air currents that *cause* dust.



DOUBLE PACKAGE MAKER COMBINATION — Made up of Small Package Maker, Volumetric Filler and Rotary Top Closure units. Produces finished package which offers maximum protection with space for complete fill.



GLUE TIGHT WRAPPER — Applies printed labels or wrappers to entire surface of carton. Glue tight wrapping gives added protection for products which are subject to sifting or infestation and adds to the strength of the carton.



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PRECISION WEIGHING-FILLING-WRAPPING-SYSTEMS

WRIGHT BAG MASTER WEIGHING AND FILLING MACHINES systems automatically apply bags, weigh the product and fill into bags, and transfer bags to sealer.

available for semi-automatic and fully automatic lines for weighing and filling a variety of dry products packaged in any type container.

WEIGHER AND CARTONER 2SG System automatically forms carton, weighs and fills product into carton, and closes.

WRIGHT HIGH SPEED WRAPPER automatically stacks cracker sandwiches, wraps them in cellophane, and seals. Also applies labels and tear tape and makes sandwiches if desired.

STRIP STAMPER automatically applies revenue stamps to bottles.

SPECIAL SYSTEMS tailored to handle specific weighing, filling and packaging problems, designed and manufactured on contract basis, when specific requirements are not met by standard machines.



Net weigher and Elevator Combination



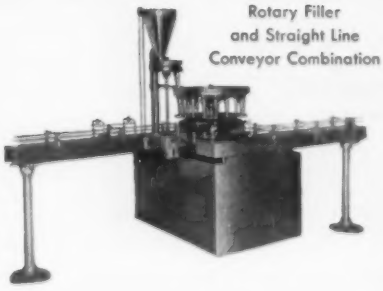
Floor Model Volumetric Filler



Bench Model Volumetric Filling Machine



Bench Model Net Weigher



Rotary Filler and Straight Line Conveyor Combination

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—automatic, semi-automatic, net weighing, volumetric package fillers, conveyors, elevating equipment, accessories

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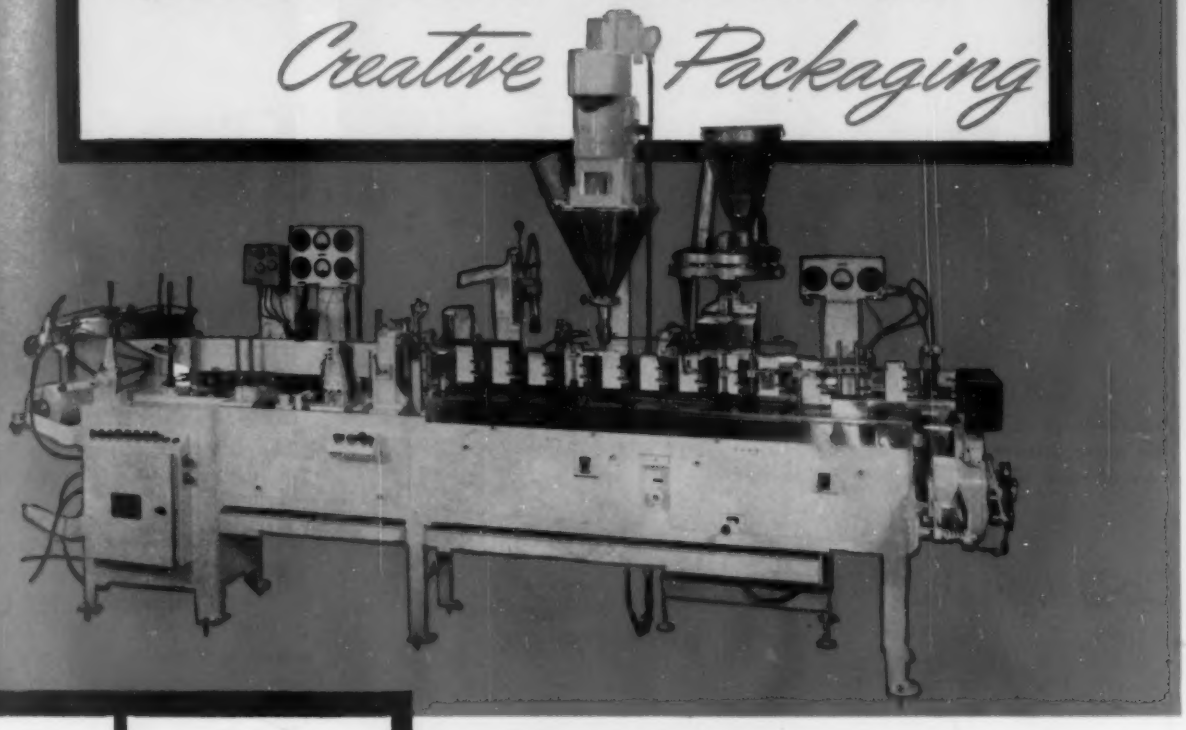
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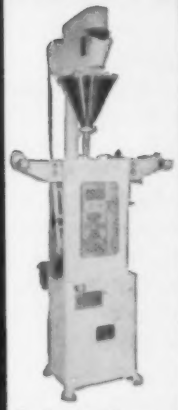
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Building an Automatic Packaging Line

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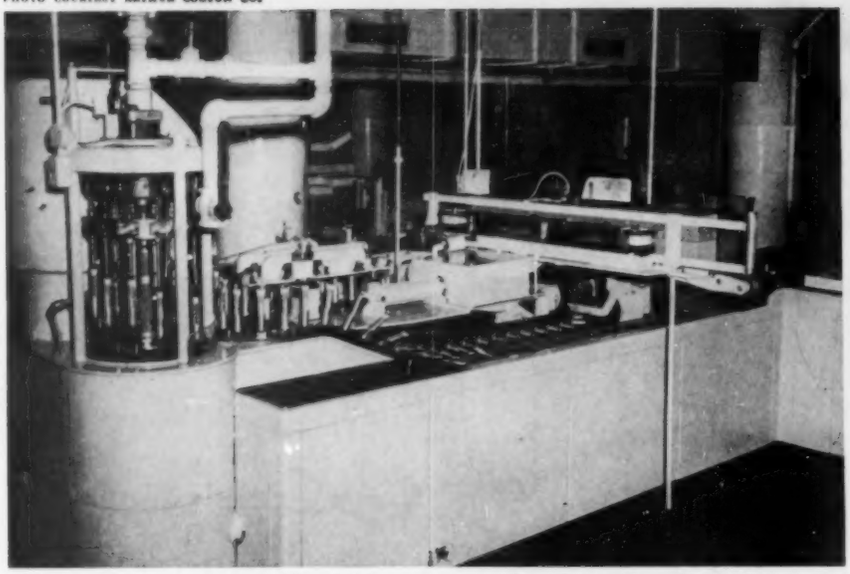


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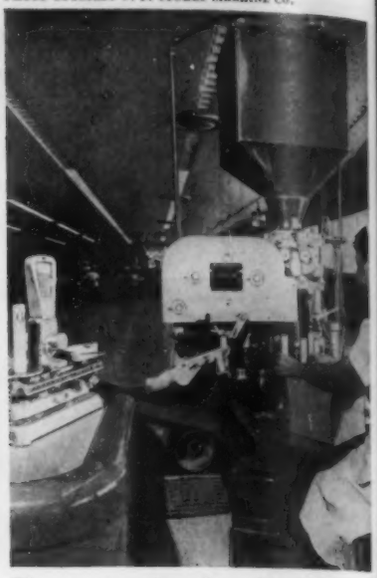
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PHOTO COURTESY ARTHUR COLTON CO.



This automatic machine fills, folds, crimps and codes collapsible tubes. Rates of over 160 a minute are achieved.

PHOTO COURTESY F. J. STOKES MACHINE CO.



The accessories for this filler are an air cleaner and a cap tightener.

Collapsible-tube filling

by H. CECIL EDGAR*

The collapsible metal tube is unquestionably an eminently practical and satisfactory package for many products. Its popularity, however, brings problems, because no one machine will efficiently and economically fill all materials packaged in tubes.

For example, fluids which are very thin and elusive can only be handled on high-precision filling equipment designed with the closest possible tolerances in piston and valve to prevent leakage and maintain accuracy of fill. Accurate seating of the valve in the nozzle is essential and tubes must be folded and sealed so as to maintain a leakproof closure.

At the other limit of the product range are heavy materials such as caulking compounds, beauty clays and certain adhesives. These in some respects are more of a problem than the thin liquids. The first two are difficult to fill into tubes in accurately metered amounts without trapping air. Therefore, special equipment is needed.

Some adhesives also involve problems because they have a stringing tendency, meaning that a "string" of the material remains between the nozzle and the filled tube and must be broken. Sometimes a "blow-off" or jet of compressed air on the filling nozzle will break this string, but there is no one remedy to meet every situation of this kind. It is sometimes necessary to wipe the nozzle and jaws of the filling machine periodically.

These extremes in tube filling are not cited with any intention of emphasizing the occasional difficulties that arise, but rather to point up the fact that the requirements in tube filling are such that no one machine can solve them all. Special equipment must be specified in many instances.

When you consider that, on the average machine, filling is done in approximately half a second and the tube-folding operation done in half that time or less, it is apparent that this equipment must be precision built and of rugged construction.

Between the two product extremes —thin liquids and viscous products— are the intermediate materials such as shaving creams, hand creams, light toothpastes, paste cheeses and salad dressings, ointments and similar preparations, which all have about the same paste consistency and which, when filled on good equipment, present no special problem whatever.

Objectives

Production aims vary a great deal between manufacturers and between products. It is the responsibility of process and production engineers to know the scope and variety of machines available, so that they may specify intelligently machines which have been engineered to the major requirements of each filling project.

High-speed automatic filling units. For instance, in this land of large and growing population with big consumer markets, production plants with whole batteries of high-speed automatic machines fill a single product—perhaps a popular toothpaste, shaving cream or hair tonic. These special automatic high-speed machines take the shipping containers of tubes, remove the tubes, load them into tube holders,

* Chief Draftsman, The Arthur Colton Co., Div. of Snyder Tool & Engineering Co., Detroit, Mich.



PHOTO COURTESY A&M TOOL & DIE CO.

Plastic-tube filler and sealer machine has top capacity of 120 per minute.

tighten the caps, align the name panel on the tube (by means of an electric eye), fill the tubes, fold the ends with a quadruple fold, crimp them and transfer them to the intake of a cartoning machine which places each tube, with or without literature, in its own individual carton. The cartoner is driven by and completely timed with the automatic filling machine.

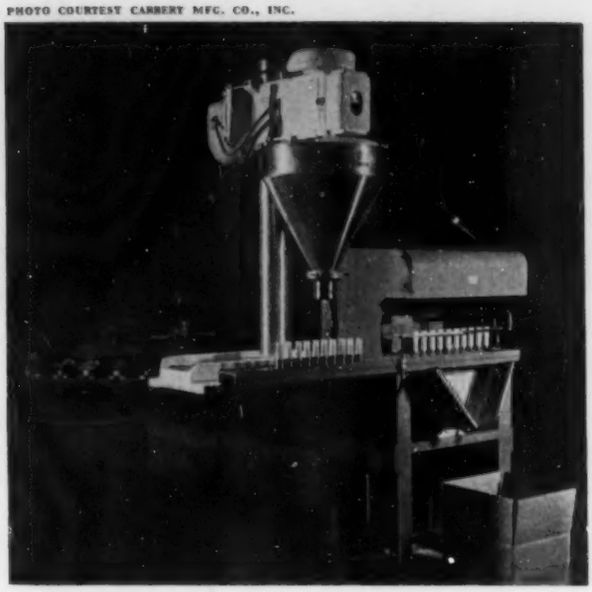
That's the picture of high-speed filling as it may be seen in dozens of great plants today, with completed tubes being turned out of single machines at speeds from 160 to 180 a minute. However, there are many plants which also fill mass-volume products but where the most desirable machine features are high production and versatility. In these plants, machines must be readily switched from one product to another and from one size to another with minimum expenditure of time.

Standard semi-automatic machines. This equipment is the mainstay of tube users, large and small, and has been for years. An operator takes the tubes from the supplier's carton, places them in the machine, where they are automatically filled, closed, crimped and ejected. Most of these machines have been brought to a high degree of perfection.

Many kinds of supplementary equipment are available, such as water-jacketed heated hoppers for handling materials that tend to thicken and agitators for materials that tend to settle. These machines handle a wide variety of tube sizes and their production capacities range up to 110 tubes a minute.

There is also a large market, both here and abroad, for hand-operated and motorized tube fillers which turn out from 20 to 40 tubes a minute. These fillers meet the need for machines geared to a limited production which would not justify investment in higher-capacity equipment. They are used with supplementary tube-closing and -crimping equipment, and may be either hand operated or motorized.

PHOTO COURTESY CARBERT MFG. CO., INC.



Semi-automatic heat-seal machine fills and seals polyethylene tubes in multiples at the rate of 10 to 30 per minute.

Service

Obviously, with such a range of equipment at his disposal, the buyer can and should ask himself which particular models most closely meet his immediate and prospective needs. Is production good enough to go beyond the hand-operated type of machine? Is there assurance of long, continuous runs that would justify installing high-speed special automatics? Is there enough volume to warrant a standard or semi-automatic machine which can be switched from one product to another? Should machines be chosen for their adaptability and for the availability of special equipment such as high-precision metering cylinders; tube cleaners; cap tighteners; stirring device; water-jacketed hopper, electrically heated and thermostatically controlled; a no-tube-no-fill device; a heavy-duty pump; special tube holders; a delivery conveyor belt?

But perhaps the most important question the user should ask is, "What about service?" Long-established, reputable filling-machine manufacturers maintain large stocks of standard replacement parts and most machines can be serviced by the user's own maintenance department. However, it is also important that the manufacturer have available service engineers who are thoroughly familiar with the design and operation.

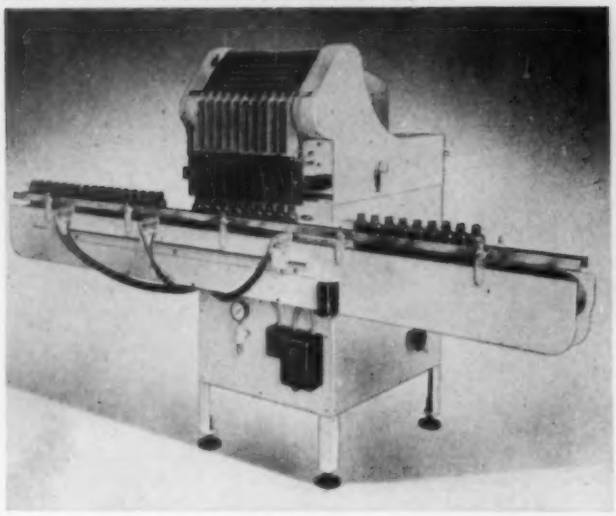
These field engineers are also valuable in the initial stages of machine selection because from their experience they can offer suggestions facilitating the proposed operations and often can help to develop the user's ideas into a successful and profitable process operation.

PHOTO COURTESY ARENCO MACHINE CO., INC.



This semi-automatic machine is designed to assure flexible operation by permitting fast and easy adjustment for different sizes of tubes.

PHOTO COURTESY U. S. AUTOMATIC BOX MACHINERY CO., INC.



Based on counting-board principle, recessed slats retain number of pills or capsules for accurate bottle fill.

PHOTO COURTESY POST MACHINERY CO.



Electronic counter is tripped when bolt interrupts light beam of photoelectric cell. Used for nails, bottles etc.

Counting machinery

by GENE LAKSO*

Counting machines of the type discussed in this article find their chief demand in the handling of pharmaceutical products such as tablets, pills, capsules and the like. Certain other products—nails and screws, food products, etc.—make effective use of counting equipment that is usually specialized in design.

Pharmaceutical counting machines can be divided roughly into three groups on the basis of the counting mechanism used: (1) a board or disk with holes, (2) a channel for measurement of a column of tablets and (3) an individual counter.

Boards or disk-type machines can be thought of as a mechanization of the hand paddle. A moving plate, disk or slat with a definite number of holes or recesses of the proper size and shape to receive the product passes beneath a mass of tablets. Each hole picks up one tablet and the overcount is then wiped off.

The smaller semi-automatic machines usually fill one bottle at a time. Those classified as automatic are equipped with bottle conveyors and are able to fill a group of bottles at one time.

Also in this group should be included semi-automatic machines that have a vibrating board with "through" holes. The vibration allows one tablet to enter each hole. When the excess is removed, the board is manually pulled forward allowing the "counted" tablets to drop through openings in a stationary board underneath. The bottle or bottles to be filled are manually located.

Measurement of a column of tablets consists essentially of holding back one tablet in the column, which is in a vertical or inclined channel, and allowing those below it to drop. The point at which the column is stopped determines the count to be dropped. A relatively short column of tablets can be used to fill practically any count at high speeds by introducing multiple drops and channels, and progressive filling. Machines of this type are available as small bench models, semi-automatic floor models and high-speed automatic conveyors.

This group of machines includes one type that will automatically count out and insert tablets in the characteristic flat aspirin tin. It can also insert a coded slip of paper, fold and insert circular, and close tin.

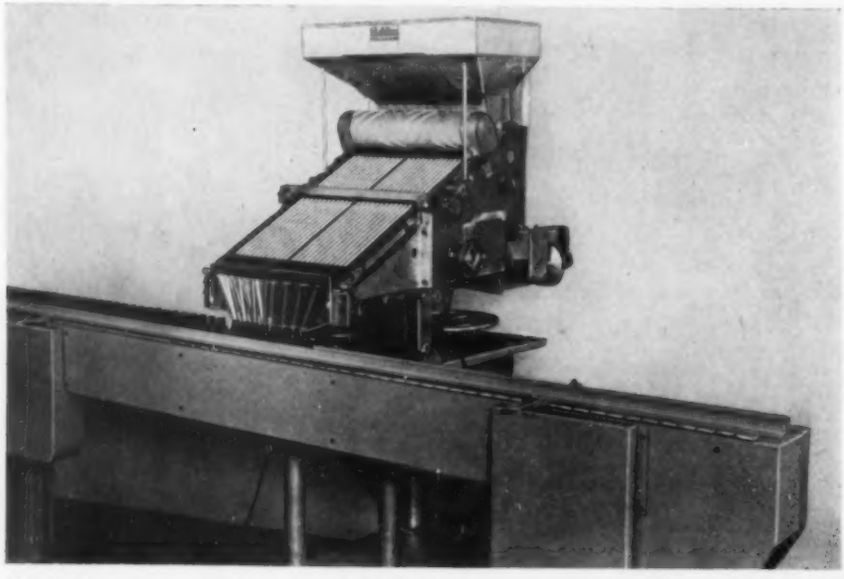
Individual counters accomplish counting in two basically different ways—mechanically or electronically.

The mechanical machines use a

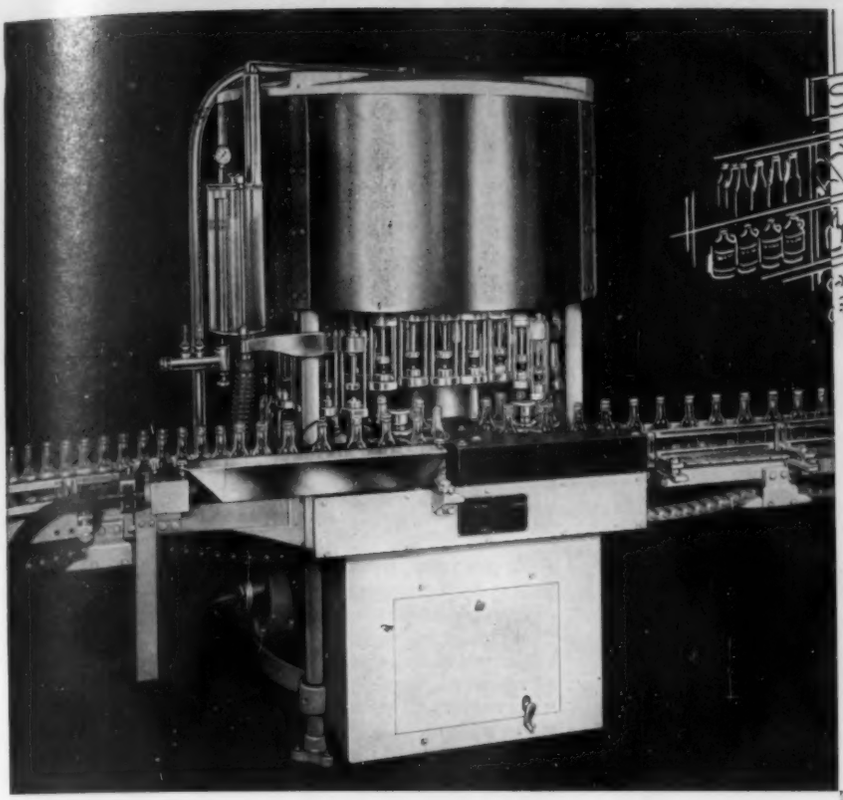
(*This article continued on page 424*)

* The Lakso Co., Inc., Fitchburg, Mass.

PHOTO COURTESY THE LAKSO CO., INC.



Versatile counter fills bottles with 100 tablets at rate of 50 to 100 bottles per minute. Tablets are accumulated in channel feed and drop into waiting bottle.



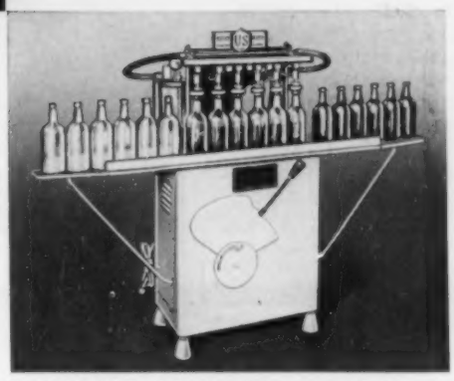


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For filling liquids to meet large-volume, low mark-up merchandising requirements, U.S. Rotary Vacuum Fillers are meriting first choice by the packagers of national brands. From the click of the starter to the end of each long run, the dependable efficiency of these machines is easing the cares of production executives the world over.

If your production schedules have outgrown your equipment, it will pay you to learn what two generations of liquid filling engineering experience can contribute to your operation. Learn, too, how U.S. automatic liquid filling equipment can be custom-engineered to your specific production requirements . . . at a substantial end saving over a standard machine.

For recommendations or quotations, please specify product, size and type of container and production in terms of fill per minute, hour or day. For details of the machine, write for the Rotary Filler Bulletin.



U. S. Model B-49 Straightline Vacuum Filler; the most automatic one-man filler. Operates with or without discharge conveyor. For all types of liquids. Write for Model B-49 Bulletin.



U. S. Model B-2 Semi-automatic Vacuum Filler. Provides efficient continuous production, filling two containers at a time. For all containers up to 4¼" dia. All liquids. Portable. Write for Model B-2 Bulletin



U. S. Siphon Filler. Efficient for all liquids including foamy products or products that do not permit agitation. Stainless steel tubes; acid resistant glass lined tank. Improved model. Adjustable. Write for the Siphon Bulletin.

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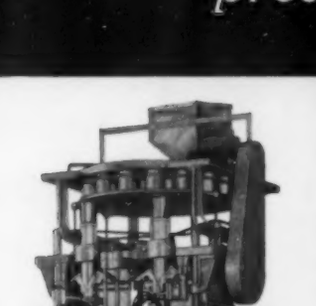
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STOKESWRAP PACKAGING MACHINE



Forms, fills, heat seals and, if desired, codes and tags packages of powders, granules, liquids or semi-liquids—foods, candies, drugs, chemicals or small metal parts—in printed or unprinted film of almost any type taken from roll stock... all automatically. Rate: from 40 up to 140 packages per minute. Capacity: Up to 1⅛ lbs. Maximum Package Size: 5½" wide x 12⅛" long. Automatic feeds: counting, net weight, volumetric, auger or liquid.

UNIVERSAL FILLING MACHINE



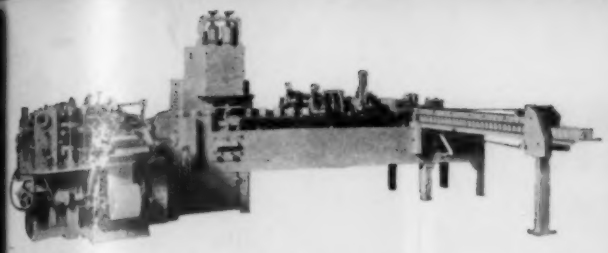
Fills granules, powders or pastes by volumetric adjustable cam, pressure packing, gross weight, or combination auger-vacuum as required. Handles a wide variety of container types and net weights from 2 gms. to 10 lbs. Semi-automatic operation up to 30 units per minute. One operator. Extreme flexibility of control and precision of operation reduces filling costs to a minimum. Also ideal for short runs, off-size containers.

NEVERSTOP CARTON FILLING & SEALING MACHINE



Feeds and fills up to 300 cartons per minute with free-flowing products such as soap powders, cereals and dried fruit... sealing both top and bottom in one continuous, automatic operation. Available in several models for different carton sizes and speed ranges. One attendant.

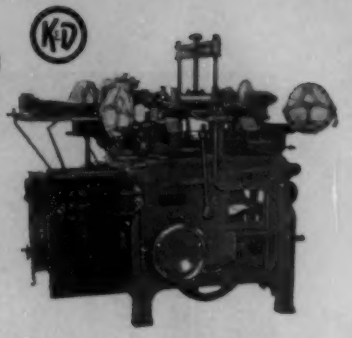
Complete information on individual machines will be rushed on request. Our Application Engineers are ready to study your requirements at no obligation. A sample of your product will help in making preliminary analyses.



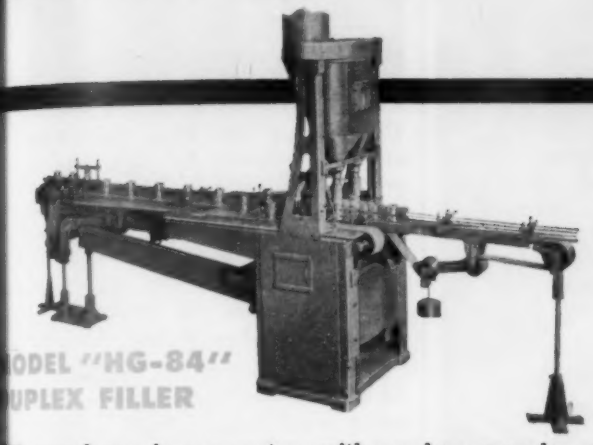
SIG PACKAGING MACHINE

kes carton and liner, accurately fills by gross weight or net ight and seals automatically. For non-free flowing products cluding dessert powders and fine flour or free-flowing mate-ls such as crystal sugars, oatmeal, etc. Produces up to 75 ckages per minute. Accordion style top fold of inner liner rmits reclosing until contents are exhausted.

THERMOPLASTIC QUAD STAYER with CORNER CUTTER

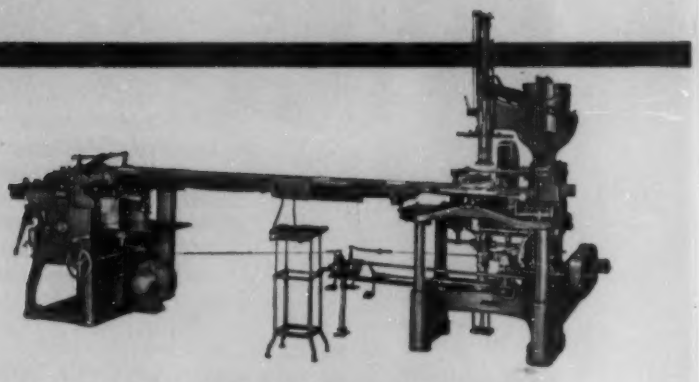


For operation with semi-automatic and automatic wrapping and gluing units. Production 20 to 50 boxes per minute. With Model "H" Stokesfeed shown below, turns out over 2,000 boxes hourly. Permits integrated, uninterrupted box making — eliminates double handling and storage space...cuts labor costs! Other model K&D Stayers available for glued stays. Speeds up to 150 boxes per minute. CORNER-CUTTER mechanism cuts four corners simultaneously from a scored blank...automatically!



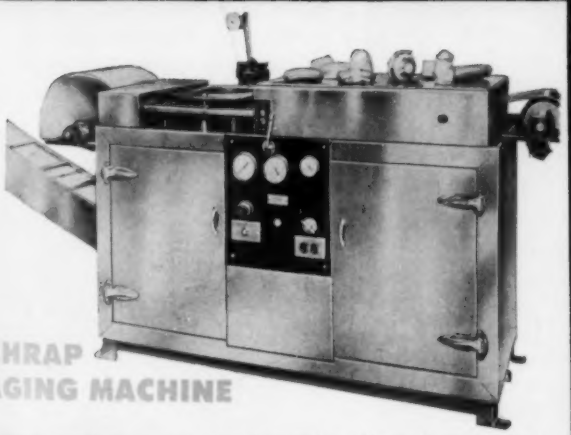
ODEL "HG-84" UPLEX FILLER

lls cans, boxes, jars or cartons with powders, granules or kes. Rate: up to 60 units per minute. Adjustability: width ¼" to 6"; thickness 1½" to 4"; height 1½" to 8". Completely tomatic auger feed with cam control to assure precise ac-uracy. Package feed: requires only one operator to place mpty container on conveyor. Also available in 4-station model ith speeds of 120 units and up per minute. Can be supplied ith "Auger-Vac" attachment for dusty products.



STOKESFEED PAPER BOX MACHINE

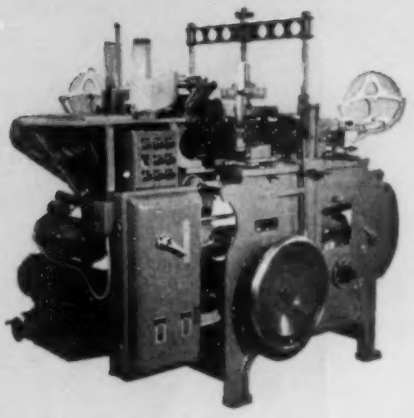
A complete paper box gluing, feeding and wrapping unit, requiring but one inexperienced operator. Five easy adjustments for quick change-overs. Model "H"—maximum: 15"x 10" x 2¾"; minimum: 4" x 1¾" x ½". Completes 40 wraps per minute. Model "B"—maximum: 20" x 15" x 4"; minimum: 6" x 4" x ½". Delivers 30 wraps per minute.



STRETCHRAP PACKAGING MACHINE

rovides snug, contour wrap for irregular shaped products cluding prepared meats, cheeses, vegetables, toys, etc. with eat-sealing Pliofilm at a rate of 12 or 15 wraps per minute. ne operator feeds product into machine.

Thermo-Pak QUAD STAYER



The only thermo-plastic quad stayer that makes a one-piece corrugated glassine box for cookies, candy and other fragile products. Eliminates the cost of inserting corrugated liners by hand. Delivers up to 70 units per minute. One operator can feed two machines. Permits delayed operation without production loss.

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product will help in making preliminary analyses.

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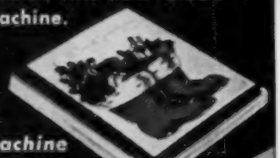
FULLY AUTOMATIC WRAPPING MACHINE

50 to 70 Packages per minute



The *Model GSA* adjustable carton Wrapper, and *Model GSU* adjustable underfold Wrapper, automatically wrap a great variety of sizes and shapes with real economy of operation. They produce precision wrapping at low cost. Easy to operate and maintain, you can cut your packaging costs with this new Globe Automatic Wrapping Machine.





THE GLOBE-WRAP

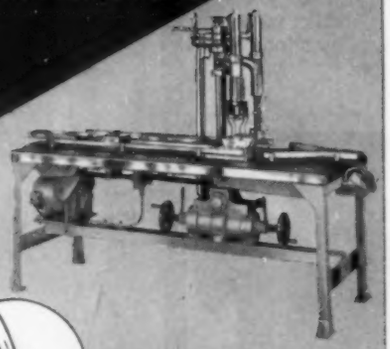
Semi-Automatic Wrapping Machine

20 Packages per minute

Model EZA—simple, compact in design, with 5 minute changeover to different size packages.

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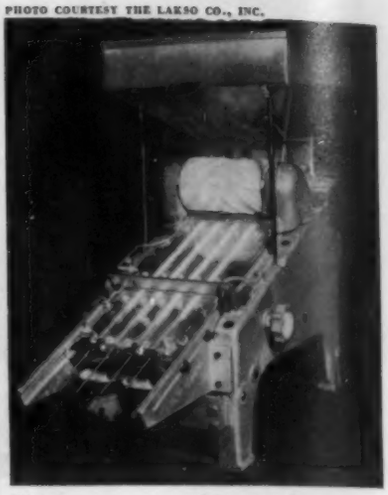
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PHOTO COURTESY THE LAKSO CO., INC.



This compact machine is almost completely adjustable for variations in product thickness, diameter, count.

group of channels in which counting wheels are placed. The wheels are so attached that the predetermined number of pockets in the wheel and revolutions of the counting wheel itself combine to attain the correct tablet or pill count.

Electronic counting is usually done with a single stream of tablets flowing through a light beam focused on a photo-electric cell. The tablets are accelerated at the point of the light beam to provide proper separation so that the resulting individual signals from the cell can be recorded.

Type of feed

Although it is not possible to divide columnar counters or individual counters according to the type of

PHOTO COURTESY POPPER & SONS, INC.



Semi-automatic counter uses counting disk. Operator positions, removes bottles, activating counting and filling.

SUBSIDIARY OF FOOD MACHINERY AND CHEMICAL CORPORATION

feed used, this is probably the most important point to consider in selecting a counter for the particular job. Vibrators, rollers, brushes, baffles and other devices are used, each having its own peculiar advantages. It should be remembered in this connection that each product type—tablets (coated and uncoated), two-piece gelatin capsules, soft elastic capsules, pills, lozenges, etc.—presents special problems. Some machines have characteristics that permit the satisfactory handling of one product type only; others may handle two or three product types if size, shape and count combine favorably. Rarely will a machine handle all product types.

Consideration of the following factors will help improve the production obtained from any tablet counter.

1. Type and size of product, which usually restrict the method of tablet feed to be employed, will affect packaging speeds.
2. The lower the count per package, the higher the packaging speed.
3. Pre-inspection, especially where the removal of free powder is involved, helps to bolster production.
4. Wide-mouth bottles can be filled more quickly and with less trouble than small-neck bottles.
5. Except in rare cases, versatility in a machine must be sacrificed to gain optimum speeds.

Machines are available for automatic cottoning, capping, labeling and cartoning capable of bottle speeds in excess of 200 per minute, but only when the five factors mentioned combine favorably can 200-per-minute

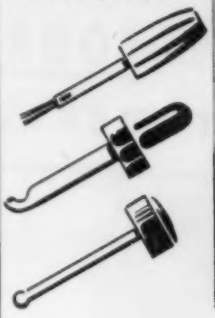
PHOTO COURTESY THE ARTHUR COLTON CO.



This 5-station counting machine is driven by motor; fills tablets, etc., at a speed of 30 containers a minute.

PACKAGING MACHINES

PMC SINCE 1919





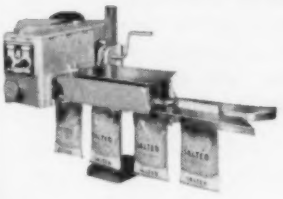
High Speed Automatic Machines for:
Capping
Carton Loading
Plug Inserting
Special Purpose Applications

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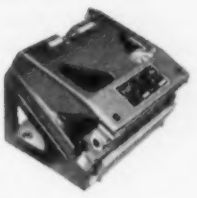
pmc INDUSTRIES
(formerly Progressive Machine Co.)
293 Hudson Street **Hackensack, N. J.**

PACK-RITE SERVES THE PACKAGING FIELD

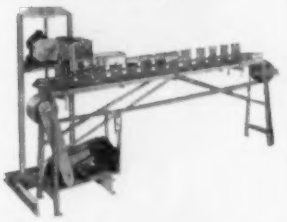
HEAT SEALERS • CONVEYORS • PACKAGE WRAPPERS
AUTOMATIC WEIGHING and FILLING MACHINES



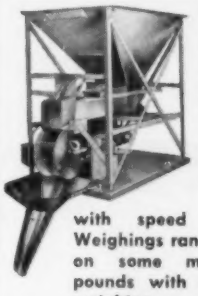
High Speed, Continuous, Rotary Heat Sealing Machines in hand and auto-feed models for cellophane, laminated types of military papers, polyethylene and other heat sealable bag materials.



Jaw Sealers for foot pedal operation with jaw lengths from 8" to 15" and for compressed air operation with automatic control of heat, pressure and dwell with jaw lengths of 38" and 50".



Packaging Belt Conveyors available in four models and a wide range of lengths. These conveyors and PACK-RITE rotary sealers are an ideal combination for fast, low cost bag sealing.



Seven Models of Holm Automatic Weighing and Filling Machines handle free flowing, semi-free flowing and non-free flowing materials with speed and accuracy. Weighings range from an ounce on some models, to 100 pounds with models for bulk weighing.



The Speedwrapper is for making a heat sealed cellophane wrap of items in trays and on boards for self-service sale. Saves cellophane — makes tight "diamond" wrap—cuts wrapping cost. For super markets, produce and food processors, bakeries, textiles, etc.

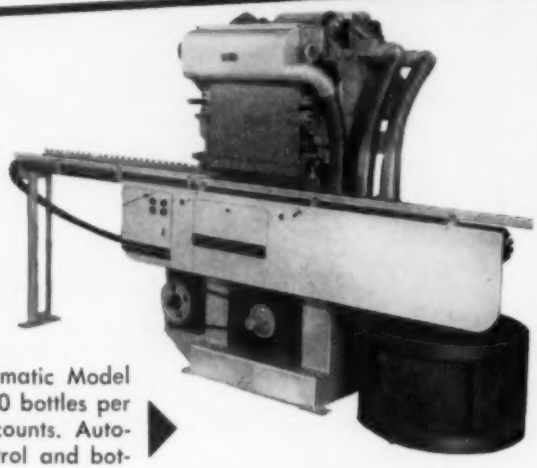
PACK-RITE MACHINES

407 E. Michigan St.
Milwaukee 1, Wis.

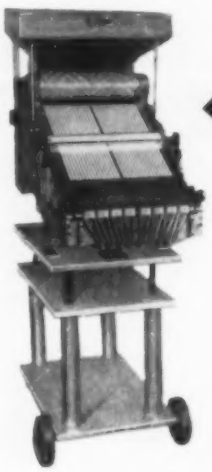
TABLET COUNTERS

designed to meet YOUR individual requirements

High-Speed Automatic MODEL 47



High-speed automatic Model 47 fills up to 200 bottles per minute of 100 counts. Automatic count control and bottle handling.



NEW "48" Tablet and Capsule Counter

Fills from 45 to 100 bottles per minute of 100 count. Accurate, easy to clean and change over. Machine is adjustable in height and portable. Can be furnished with conveyor or installed over plant conveyor.

Table Model "SAMPLER"

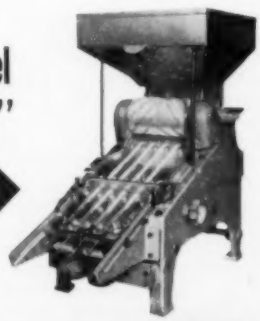


Table Model "Sampler". This compact table model is designed for use where quick change-over is most important. Completely adjustable, fills from 20 to 40 bottles per minute of counts less than 100.

THE Lakso COMPANY, INC.
FITCHBURG, MASSACHUSETTS

PHOTO COURTESY F. B. REDINGTON CO.



High-speed aspirin-tablet counter inserts coded slip and a circular and closes the flat tin container.

tablet-counter production be achieved. For example, aspirin tablets in 100-capacity bottles are filled at over 100 per minute only in rare cases and 60 per minute is about the top speed for 200- and 250-count packages.

A packager not using a counting machine at present need no longer feel that the introduction of a machine is going to lower finished package standards. There are cases where machines have consistently produced packages that are cleaner and more accurately filled than was ever possible by hand methods.

A prospective buyer should make every effort to see that the counter manufacturer is furnished with a supply of production samples, including the product and the container. Although printed specifications may be adequate, they can be misleading.

PHOTO COURTESY U. S. ENGINEERING CO.



The machine shown above individually counts tablets by means of an electronic counter and photoelectric cell.

TYPICAL INSTALLATIONS

PRUNES



FROZEN VEGETABLES



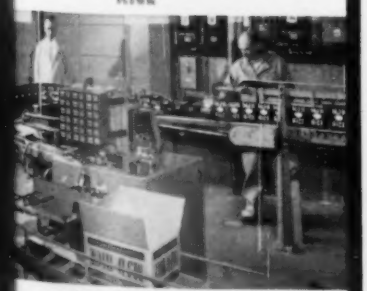
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SURE-WAY PACKAGE CASER

...an entirely new concept of automation applied to packaged product casing

Tried—Tested—Proved—The "Sure-Way" Package Caser has fast become first choice wherever low-cost, automatic, high-speed casing is required. It passes every test for performance and versatility with its gentle, near-human handling of scores of package types and sizes. On frozen foods, cake mixes, rice, sugar, beans, cereals, oleomargarine, bar soap, powdered soaps and detergents, cosmetics, small packaged machine parts — on virtually any product packaged in a rigid or semi-rigid container, or product that takes a rigid shape—the "Sure-Way" leads the casing field! Speeds up to 240 packages per minute in continuous operation with only one operator! Change parts available to accommodate a variety of package sizes and casing patterns within certain ranges. Send the coupon for all the facts.

The versatile, low-cost "Sure-Way" cases a wide variety of package weights, sizes and arrangements.



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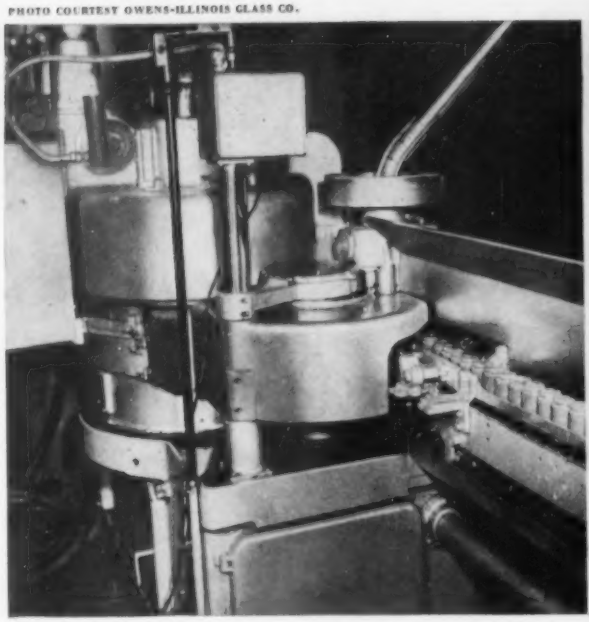
Canning Machinery Division

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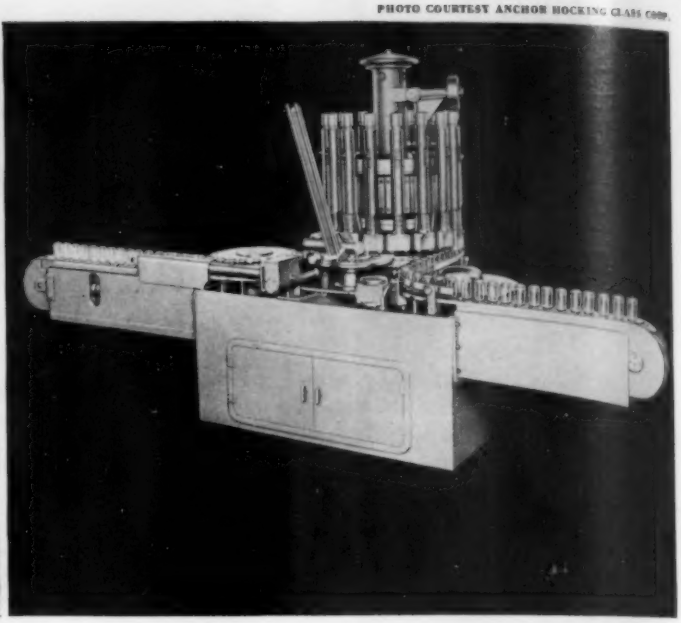
The outward sign of inward value

PHOTO COURTESY OWENS-ILLINOIS GLASS CO.



Baby jars are stack fed for vacuum side sealing. Rotary machine can handle more than 700 per minute.

PHOTO COURTESY ANCHOR HOCKING GLASS CORP.



Caps are applied with a steam or mechanical vacuum seal at rates of 200 to 1,000 a minute by this 16-head rotary machine.

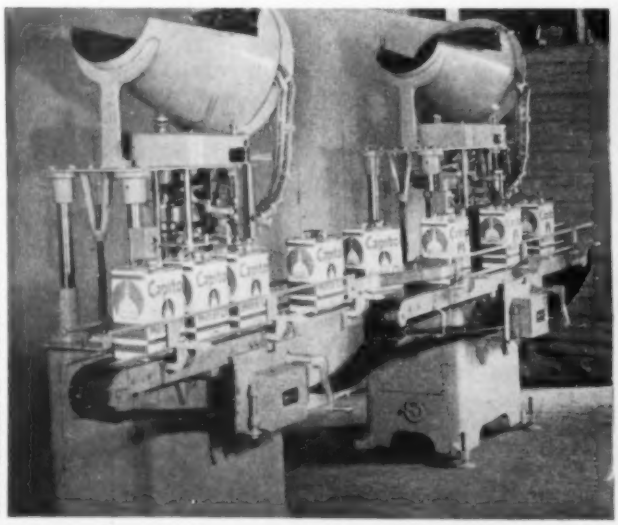
Capping and sealing equipment

Since the first screw cap was used to seal a glass container, many types of machines have been developed for its application—both automatic and semi-automatic. Today there are a number of good automatic capping machines on the market that are either rotary or straight line in operation. They range in speed from 20 to 1,000 units per minute and handle containers from vial size to 1-gal. and 2-gal. capacity, applying caps 10 to 120 mm. in diameter.

The development of these capping machines, which took many years, in turn prompted the development of corresponding speeds in related machinery like fillers and labelers.

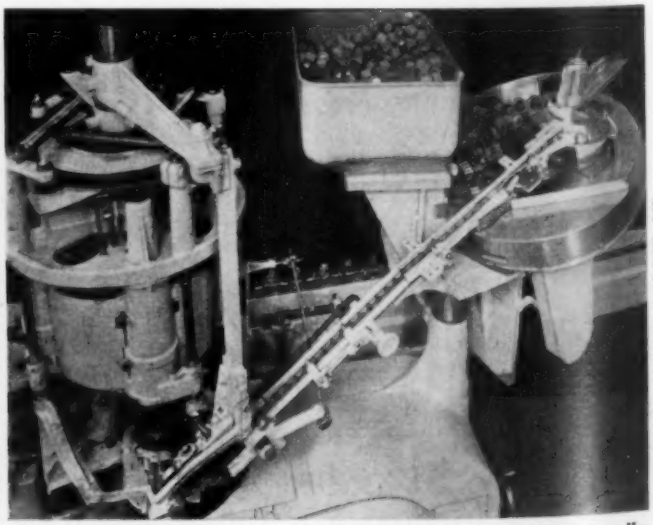
Not all containers and caps are suitable for high-speed handling. Some of them cannot withstand shock and some containers lack the stability needed on high-speed lines. For these reasons, package designers must keep in mind, where large volume is a goal, that a fancy closure or container which may be needed for merchandising reasons must be designed so that it can be handled at high speeds. A good example of what can be done

PHOTO COURTESY RESINA AUTOMATIC MACHINERY CO., INC.



This machine applies reseal closures and tamperproof bands to metal and glass containers. The speeds for pints and quarts range from 20 to 60 units a minute.

PHOTO COURTESY PNEUMATIC SCALE CORP., LTD.



This cap feeder for use with rotary capping machines handles turn-on or lug-type plastic or metal closures up to 37-mm. diameter. It rejects caps which are not properly positioned.

in this way is the bowl-like cherry jar introduced a few years ago for maraschino cherries, jams and jellies, relishes and other food products.

Probably closer tolerances are maintained in the manufacture of glass containers and caps in the United States than in other countries, but not all American closure manufacturers make the same type of thread. Though the caps they make do effect a good seal, the problems of capping at high speed are intensified by these differences in thread design. Particularly with the increased use of plastics for closures, improvements not only in size tolerances but in shock- and torque-resisting qualities are necessary.

The rolled-on closure (see "Closures for Rigid Containers," p. 365) is sometimes a good answer to the problem of cap fit. Made of ductile metal, roll-ons are applied by a machine which exerts sufficient pressure to create a fit tailor-made to the container neck even though tolerance may be wide.

Until a few years ago the only high-speed cappers were of the rotary type. These were then and are today valued for their compactness and, in addition, they have many good features of operating efficiency. The straight-line type of capper is comparatively new on the market, but it is here to stay, for it has many desirable features not found in rotary machines. It needs no chucks, levers nor star wheels and can operate at higher speeds than the rotary capper without spilling of liquids or powders. Straight-line cappers have greater flexibility in container and cap range, with fewer change parts needed, and the time lost in change-over is only a fraction of the time required by rotary machines.

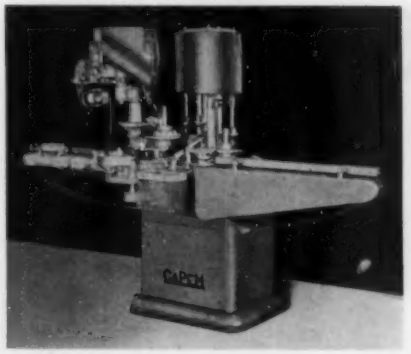
The containers enter the machine in a straight line and proceed without a stop, turn or interruption from the moment the bottle engages the cap until it leaves the last tightening station. One machine has been tested at speeds close to 400 per minute on certain cap and container sizes. It will handle almost any type of cap, whether screw or lug, shallow or deep, metal or plastic, with positive cap control, giving the smoothest capping operation yet devised.

Several semi-automatic cap-tightening machines are available that are useful for limited production, for short runs or for the small manufacturer starting out in business. One of these machines has been so designed that it can be converted to fully automatic operation by the incorporation of special parts available at nominal cost.

A word should be said about the problems of cap tightening. There is nothing quite so exasperating to the housewife as an obstinate bottle closure that resists all efforts to loosen it. Yet the manufacturer must effect a tight seal to assure transit and merchandising without damage, loss or tampering. The capping machine should be inspected daily to make sure that torque is at the proper point between the extremes that result in too loose or too tight a closure.

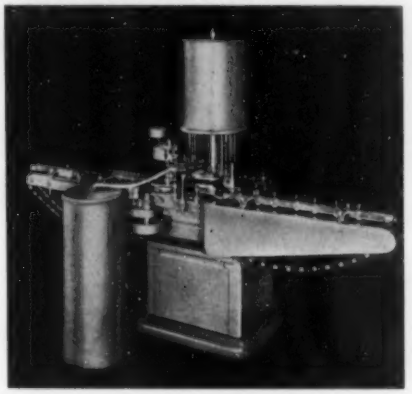
A related problem concerns the cap liner. The liner is chosen on the basis of product requirements (see "Liners and Seals for Closures," p. 373), and its object is to keep the product in the container by maintaining the seal. Too great pressure on the cap liner will defeat its purpose by destroying the resilience which enables it to function. Too little pressure may result in leakage or seepage if the product is a liquid; or there may be admission or loss of moisture with a dry product.

CONSOLIDATED PKG. MACHINERY CORP.



High-speed capper applies rotated caps to bottles or cans at speeds which range up to 300 per minute.

CONSOLIDATED PKG. MACHINERY CORP.



This automatic cotton wadder for tablet or capsule packaging is available with from one to eight tucking heads.

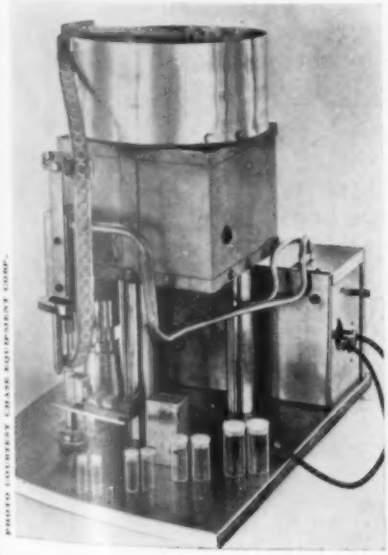


PHOTO COURTESY CHASE EQUIPMENT CORP.

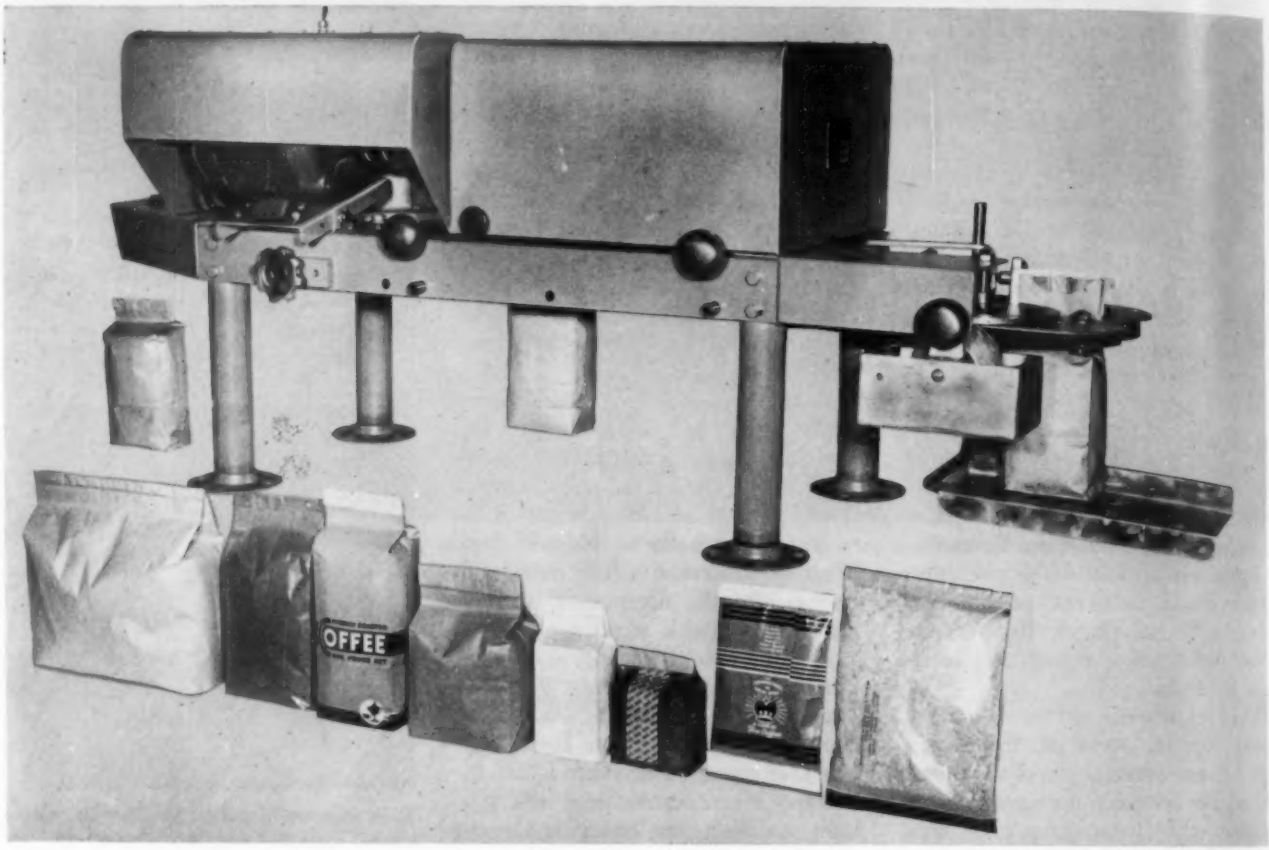
Polyethylene stoppers are placed into glass vials semi-automatically or automatically by machine adapted from standard equipment for rubber stoppers.

Series arrangement of hood former, filler and sealer permits integrated line in milk-bottling plant.



PHOTO COURTESY ALUMINUM CO. OF AMERICA

Something Really NEW in a Paper Bag Closing Machine



Fry CONTINUOUS-MOTION Bag Closing Machine (Model GS 54)

DOUBLE FOLDS and GLUES -OR- DOUBLE FOLDS and HEAT SEALS -OR- DOUBLE FOLDS, HEAT SEALS & GLUES

. . . Makes Strong, SIFT-PROOF Closures

Other Models

Model CBS	Table Model Bag heat sealer for small envelopes and heat sealing bags.
Model CBG	Bag Closing Machine with conveyor for coffee and similar bags where a flat top to the finished bag is required.
Model CSG	Bag Closing Machine with conveyor for folding, gluing and heat sealing large bags up to 25 lbs.
Model V-30	Bag Settler for vibrating and moving packages.

Send us details of your requirements and we will advise whether one of our units can profitably serve you. Descriptive literature available.

GEORGE H. FRY COMPANY 42 East Second Street Mineola, New York, U.S.A.

U. S. AUTOMATIC BOX MAKING & PACKAGING MACHINERY



BRIGHTWOOD BOX MACHINES

MODEL CM-2 High Speed Brightwood machine produces up to 120 finished pieces per minute. Size range from 2 x 2 x ¼" deep up to 14 x 7 x 3½" deep in styles as shown at left. Changeovers are quickly made at very moderate cost.

STANDARD An extremely versatile machine that automatically glues and forms boxes in a much wider range of sizes and styles than shown at left at speeds up to 60 per minute.





UNIVERSAL Full automatic for making a wide range of different sizes of boxes at low production costs. It forms and glues turned-over end boxes from creased or scored blanks with or without double side walls, in addition to standard single end boxes, at speeds up to 70 per minute.



AUTOMATIC TABLET BOTTLING MACHINES

The latest development in the filling of pills, capsules and tablets, coated and uncoated into bottles or other rigid containers. Correct count a mechanical certainty; no tablet breakage; fully automatic or semi-automatic; speeds up to 120 containers per minute.



CANDY AND COUGH DROP CARTONING MACHINES

MODEL C-10 Automatically opens flat carton, tucks bottom, cuts liner from roll, forms and inserts liner, counts or volume fills candy then tucks in and closes liner and top flaps of carton. Liner can be omitted when desired. Speeds 60-100 per minute.

MODEL C-21 For small and sample size cartons. Two magazines feed flat cartons to opener, bottoms are tucked, both are filled simultaneously then tops tucked. Can be equipped for lining or wrapping or both. Speed 150 per minute.





FILLING MACHINES

"BOND" Automatic or semi-automatic models for packing, gross weighing or volume filling. Handles face powder, talcum, flour, soap powder, cocoa, etc. Speeds up to 120 per minute.

SCOTT Net weighers for weighing and filling coffee, rice, peas, tapioca, tea, crackers, etc. Semi-automatic; speeds up to 45 per minute with one operator. Fully automatic (rotary and straight line types); speeds up to 60 per minute.

SEND *US* DETAILS ON ANY OF YOUR PACKAGING PROBLEMS—WE HAVE THE MACHINES AND THE ENGINEERING BACKGROUND TO HELP SOLVE THEM

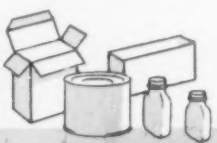
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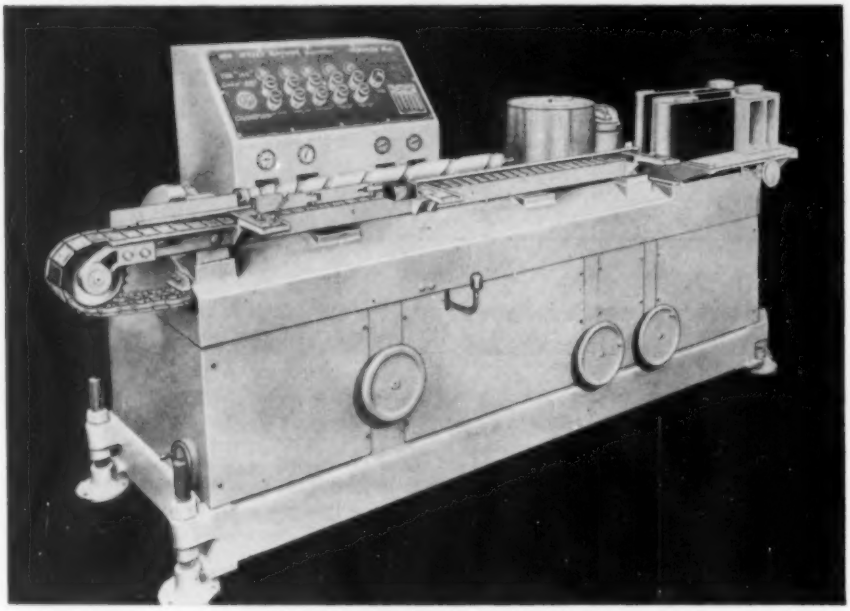
Labeling equipment

by JAMES F. PARSONS*

The manufacturer of today, keenly aware of the value of well-designed, well-executed labels providing identification of, information about and colorful selling appeal for his products, has a great range of labeling methods and equipment to choose from. He has only to select those most effective and economical for the given purpose. The means at hand run the gamut from the time-honored pot and brush, through semi-automatic, up to high-speed, fully automatic machines, and the labeling equipment of this mass-production era meets every application as well as volume requirement—spot labeling, half wrap, full wrap, neck, back, medallion, foil and all labeling combinations.

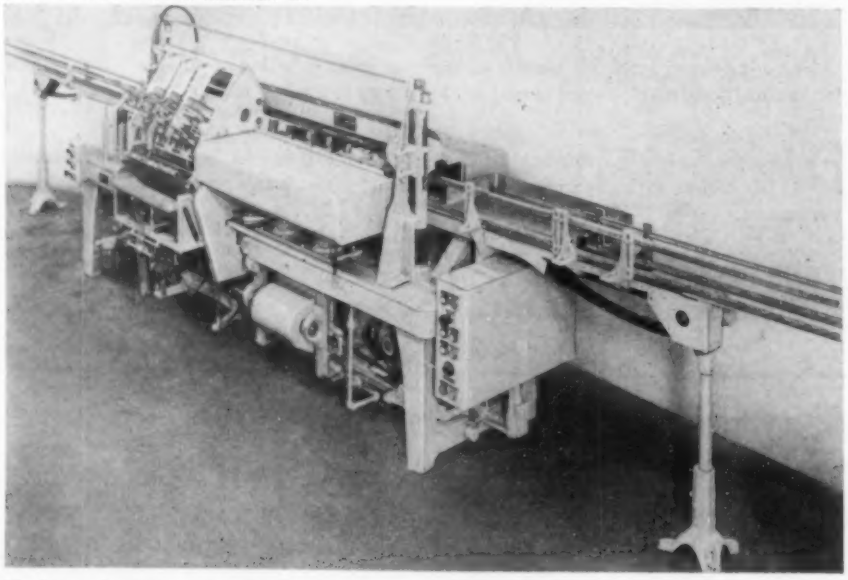
* Sales Manager, Economic Machinery Co., Worcester, Mass., Div. of Geo. J. Meyer Mfg. Co.

PHOTO COURTESY NEW JERSEY MACHINE CORP.



Labeling machine for fully automatic bottling line uses heat-activation principle to apply thermoplastic labels on bottles or jars 1-cc. to qt. size.

PHOTO COURTESY ECONOMIC MACHINERY CO.



High-production, straight-line, continuous-motion labeler applies body, front, back, neck labels simultaneously—speeds to 300 bottles a minute.

Deciding when to change from one method of labeling to another is usually a matter of simple arithmetic balancing the cost of the equipment against the direct savings in labor. At times the effect of labeling output on the rest of the packaging line has to be considered. Inadequate labeling methods can be an expensive production bottleneck and, by the same token, mass-production automatic labeling can be justified only when production runs are of sufficient duration.

The modern automatic labeling machine can turn out labeled containers at virtually any desired rate up to 450 per minute. This means not only single labels, but front and back labels, or front, neck and back labels. Factors influencing the selection of proper equipment for the job—semi-automatic or fully automatic—are the number of changes in container and label sizes and shapes per day or per week. Fully automatic labelers now available can be changed over completely in as little as 10 or 15 minutes. This compares favorably with the change-over time for semi-automatic equipment. Length of production run being a key factor in the determination of what labeling equipment to install, it follows that the user should consider carefully how much standardization can be reasonably effected not only in labels but in container shapes and sizes.

He should also remember that change parts or attachments are somewhat expensive and that needless variations in containers and labels may prove a costly proposition.

Another important factor to consider when choosing a labeler is the way it fits in with the rest of the equipment on the packaging line. For example, it would hardly be wise to put in a labeler having a capacity of 200 containers per minute if the filling or capping equipment operates at no more than 150 per minute. The slowest-rated unit on the line is the one that influences the selection. It is common practice in many instances to double up on equipment or split the line when production requirements warrant it—two fillers to one labeler, or one filler and one capper to two labelers, as the case may be.

Now, let us consider the variable

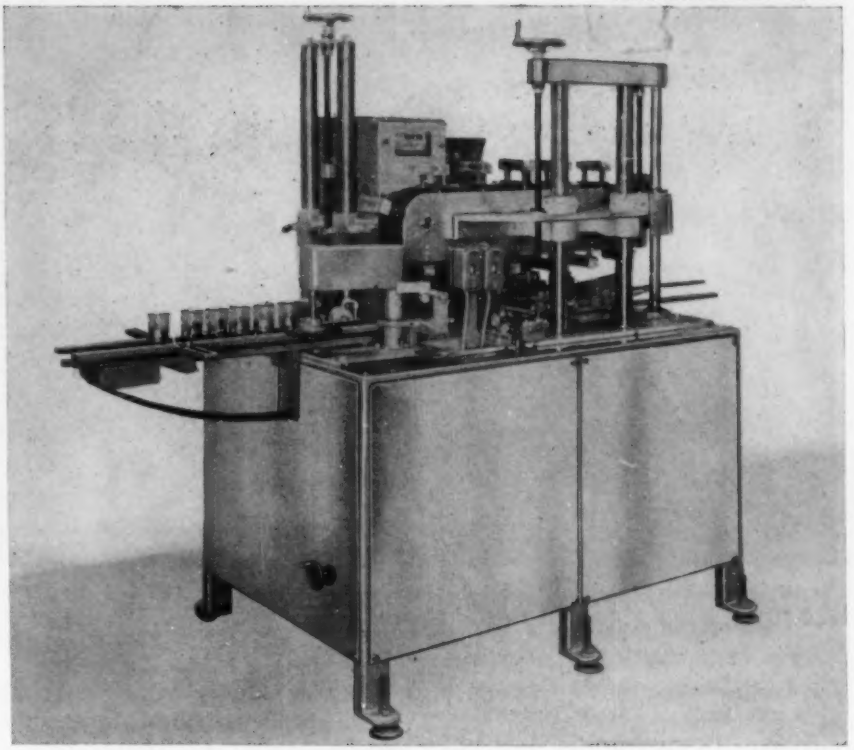
factors affecting labeler operation. In the first place, the container itself is subject to the tolerances established by the manufacturer. Where the containers come from a single source, as in the case of nonreturnable bottles, this may have little significance. Where bottles are re-used, however, containers from several sources may be running through the labeler at the same time. This means that the labeler must have sufficient flexibility built into it to take care of any variations that occur.

Next, is the label itself. It is of prime importance that the grain of the label paper be in the proper direction to allow for the curvature of the container. This is up to the printer but it is a good idea to remind him of it before he prints the labels. Usually, the grain should be parallel to the printing on the label—in other words, to the direction of label wrap on the bottle. Wrong grain direction can cause no end of trouble in label application and no labeling machine built can overcome this trouble.

Improper label-storage conditions can cause trouble, too. Excessively dried out or excessively moist label paper are both bad. Use of the right printing inks on labels is another essential. Quick-drying inks that will not smear when pressure is applied are what the doctor ordered for labels.

A labeling machine should not be expected to compensate for improperly cut and, therefore, off-size labels. The margin of error should be no greater than 5% at most. When placing the labels in the holders on the labeling machine, the operator should make sure that the labels are well separated.

PHOTO COURTESY MRM CO., INC.



New type of labeler is designed for flexibility—adjusts for various shapes and sizes in about 15 minutes, requiring minimum change parts.

Once in a while it happens that the label is not designed to fit the container, particularly where a compound curve is involved, and a consistent wrinkle may appear. Where reshaping of the container or the label is not immediately possible, a color change in the label at the wrinkle area may provide excellent camouflage.

Finally, the label adhesive must be considered. The great technological advances of the present day have largely eliminated any inherent difficulties with adhesives. Adhesives are available to meet whatever conditions may be set up by the user or the labeler manufacturer. They may be iceproof, waterproof, alcoholproof or what have you. Adhesives that penetrate the label paper with lightning speed have been important in success-

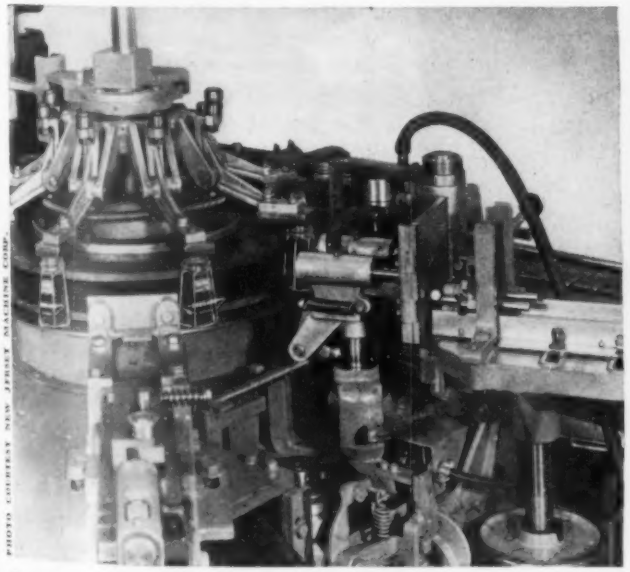


PHOTO COURTESY NEW JERSEY MACHINE CORP.

Speedy, versatile labeler has twin roller micro-controlled glue system and suction pickup.

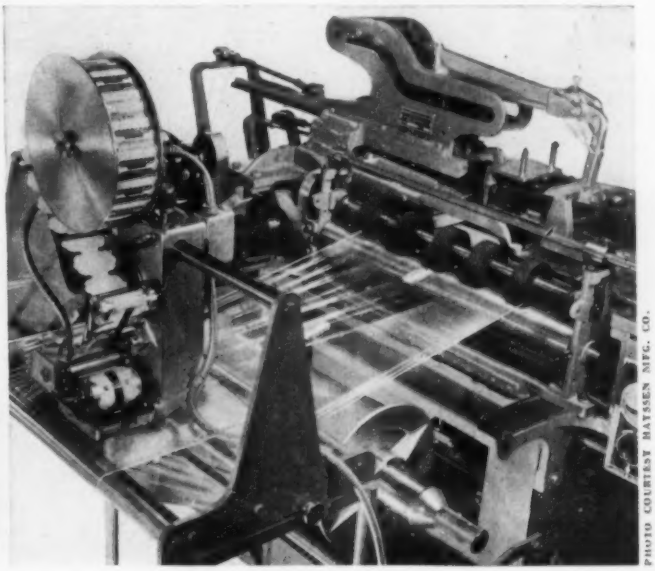
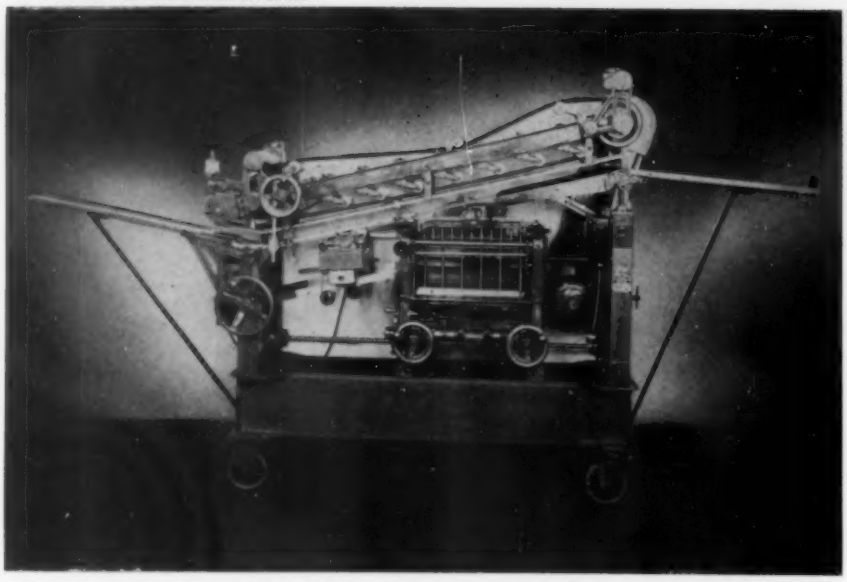


PHOTO COURTESY MATTSEN MFG. CO.

Top labeler applies labels to web before product is wrapped. Neat wrap, perfect registration result.

PHOTO COURTESY CHISHOLM-RYDER CO. OF PA.



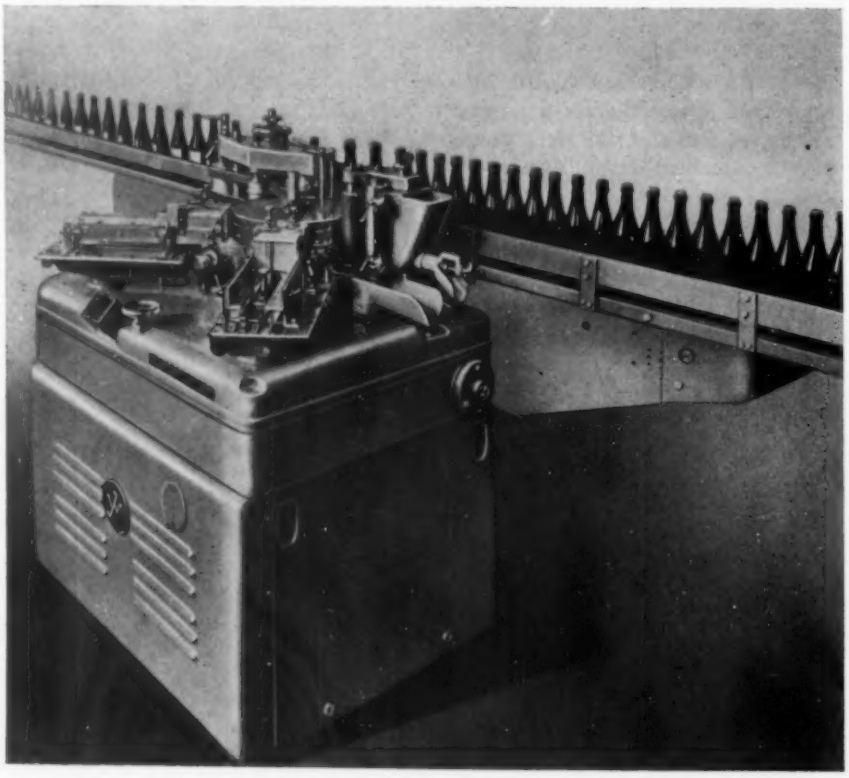
Versatile labeler for cylindrical containers is adjustable for 112-403 diameters 112-708 high and 200-611 diameters 200-708 high.

ful labeler operation. Again, there may be adhesive-storage problems to watch out for, both in and out of the labeling machine.

The product itself is seldom a factor unless it has an oily character and is spilled onto the surface of the container during filling. The remedy for this is not to be found in the labeler but in the cause of the spillage.

A few years ago a method known as thermoplastic labeling was introduced. In this method the adhesive is pre-applied to the paper label and the application of heat during the labeling operation activates it so that the label adheres to the container. The problem of adhesive application is simply transferred to another part of the process.

PHOTO COURTESY PNEUMATIC SCALE CORP., LTD.



German-type machine applies glued labels to round bottles. Two models available. One, labels 160 bottles a minute; the other, 250 to 300 a minute.

A leading manufacturer of decalcomanias has developed machine application for ceramic decals to all sizes and shapes of containers. The one exception is the application of a decal to a compound curve, but this application is not feasible with a paper label either without unsightly wrinkling. Several of the leading glass manufacturers now have this type of machinery and are prepared to pre-label glass products. This method should have interesting possibilities as compared with color printing directly on glass containers, for it permits silk-screen printing of labels and therefore a greater range of color and attractiveness. Instead of the two colors that are economically practical in ACL, the machine-applied decal may have as many as 14 colors, all in accurate register with one another.[1]

Development of labels in roll form for use on labeling machines has also been carried on. This requires special printing facilities. The procedure is of special interest to the pharmaceutical industry, where strict control over labeled items has to be maintained.

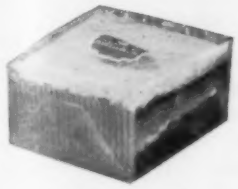
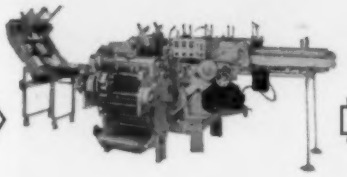
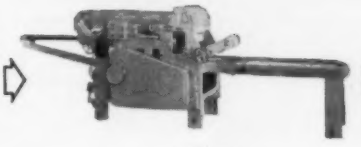
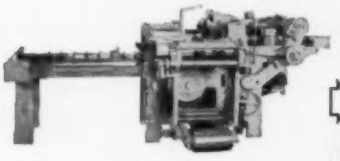
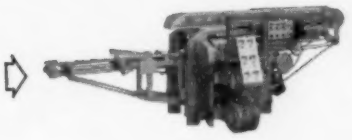
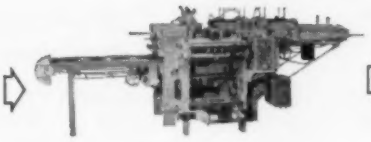
The variety of labeling problems is of course infinite. On some products, notably wines and spirits, the position of the labels on the bottles must be accurately maintained. This is accomplished by locating a spotting bar or raised lug on the container, the labeling machine then rotating the bottle into precise alignment for label application. This same positioning lug is used to align the strip stamp and the cellulose band.

In the brewing industry—the largest user of glass bottles in the United States—continuous and uninterrupted labeling is of paramount importance. Beer is pasteurized in a fixed period of time and a hold-up of the production line at the labeler would result in overpasteurization of the product. Because of this breweries have adopted the "tandem" principle combining a number of labeling units with common feed and discharge conveyor system. When one unit is taken out of the line, the others are readily speeded up to take over the full production load. This guarantees continuous operation and has saved the industry countless thousands of dollars over the years.

In the carbonated-beverage industry, seasonal peak production is an important factor and the labeling prob-

[1] See "Fired-on Decals," MODERN PACKAGING, Feb., 1955, p. 115.

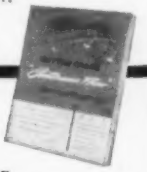
WHICH solution fits your packaging problem best?

	The PACKAGE	The MACHINE	The RESULTS
1		 MODEL 47B	Delicate iced cakes are wrapped in Cellophane at speeds of 40 to 70 per minute . . . yet each cake is handled so gently by the ***"Continuous Flow"*** process that each one comes out undamaged with a firm, attractive "show-case" wrap.
2		 MODEL 201	A skin-tight wrap that helps keep bacon from turning dark or rancid due to oxidation. Through new exclusive paper tension control, and a special method for "rolling out the air," a neater, more eye-appealing, better sealed package is obtained. Speeds up to 50 per minute are obtained with no sacrifice of wrapping efficiency.
3		 MODEL 43	A typical example of Battle Creek engineering for merchandising. Loose soda and graham crackers are wrapped in individual ¼ or ⅓ pound glassine or Cellophane packages at speeds of 60 to 85 per minute. Meal-size servings help eliminate the soggy crackers of yesteryear.
4		 MODEL 51	Attractive packages perfectly sealed in wax coated paper at the rate of 160 packages per minute are routinely produced through the ***"Continuous Flow"*** process of Battle Creek packaging machines.
5		 MODEL 47B	These irregularly shaped products are wrapped at 50 to 70 packages per minute in Cellophane. Each item is carefully handled by the ***"Continuous Flow"*** process so that they stay undamaged and unsoiled. The sparkling Cellophane overwrap increases impulse purchases at the retail level.

BATTLE CREEK
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Continuous Flow

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HEAT SEAL ANYTHING—*Overwraps, Bags, Labels*
USE ANY FILM—*Cello, Pliofilm, Saran, Poly*
DO IT BETTER *at* LESS COST *with Great Lakes!*





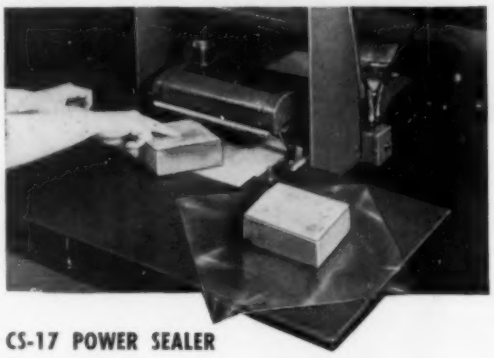
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LABEL ACTIVATOR

for instant no-curl label activation

Activates labels instantly. Suction through slotted top holds labels flat, ready for instant permanent adhesion to any shape package. Available in 2 styles, 3 sizes for movable or permanent placement. The superior method!



CS-17 POWER SEALER

Will seal, label and code mark packages as rapidly as assembled. Ample work platform for 2 operators to assemble and wrap; completed packages are carried under heated sealer head by belt. Packages discharge at rear for boxing, etc. Takes packages to 5" thick, 9" wide, any length. Adjusts for speed and temperature. Seals any film.

FLAT SEALING PLATES

Types for bench use, for insetting flush with table top, or vertical types for special application. Several sizes and styles of each. Long life elements with adjustable thermostat control. Plain or Teflon covered.

ASK FOR FULL DETAILS

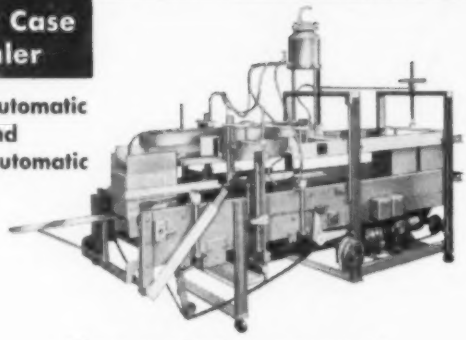
We invite your special sealing problems. We specialize in marking, labelling and packaging the effective way at low equipment cost.

GREAT LAKES
STAMP & MFG. CO., INC.
2500 Irving Pk. Rd., Chicago 18
Heat Sealing, Labelling and Product Identification Specialists

The greatest advancement in packaging history!

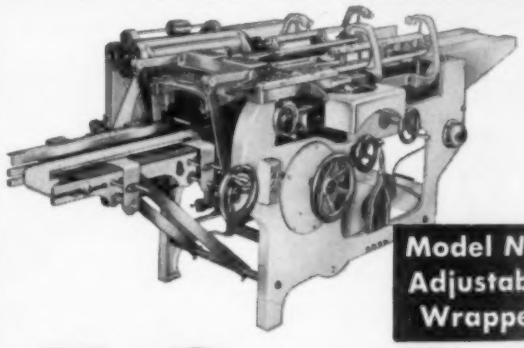
Short Case Sealer

Semi Automatic and Fully Automatic



New, exclusive, patented
GLUE VALVE APPLICATOR

- Continuous uninterrupted operation.
- No mess, no cleanup.
- Rapid adjustment to wide range of sizes.



Model NCP Adjustable Wrapper

No Change Parts

Rapid adjustment of all dimensions by handwheels

Specifications

	Length	Width	Height
Maximum	12"	7¼"	3½"
Minimum	5"	2⅛"	⅜"

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153-157 CROSBY STREET — Packaging Division — NEW YORK 12, N. Y.

lem has been solved by the use of multiple, or tandem, units on a single bottling line. The present extensive employment of multiple labels in both the brewing and the carbonated-beverage industries is made possible by these multiple-unit labelers.

Maintenance. Whatever the type of labeler employed, systematic lubrication and cleaning pays off for labeling equipment as much as, if not more than, any other plant equipment.

Can-Labeling Equipment

by E. J. Abendschein*

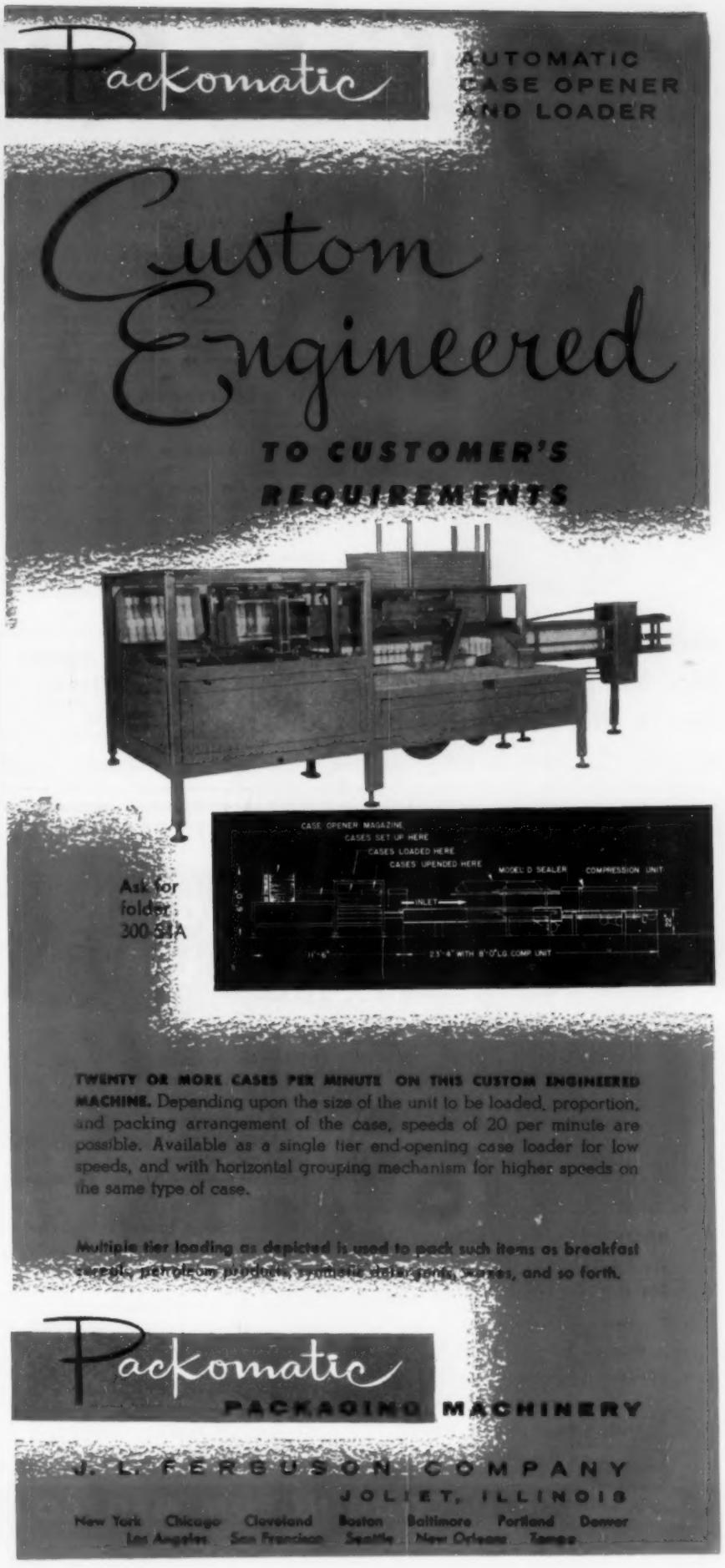
Can labeling today is basically the same as it has been for a good many years past. However, operators have been insisting on higher and higher speeds and labeler manufacturers have concentrated on supplying a machine which will operate at these higher speeds. The improvements which have been made are almost entirely in the method of glue application and the method of label pickup.

In the conventional machine, cans are fed in a rolling motion into the labeler where belts continue to roll them through the machine. They first pass over glue applicators, where they pick up a spot of adhesive. They next pass over a stack of labels which lie horizontally. Passage of the can is so timed that the spots of sticky adhesive on its body touch the edge of the top label, thereby pulling it around itself. While the label is waiting to be picked up, however, paste is being brought across the end of it by a belt so that paste is deposited on the overlap end. Therefore, when the label is rolled around the can, the overlap seals against the other end of the label. The can then rolls over a soft pad which seams the overlap tight. It is finally discharged, still in a rolling position, at the end of the labeler.

As mentioned, the improvements on labeling machines developed in the last decade are all directed toward increase in the speed of labeling, since higher labeling speed reduces costs and tends to balance out the higher labor and product costs prevalent in recent years.

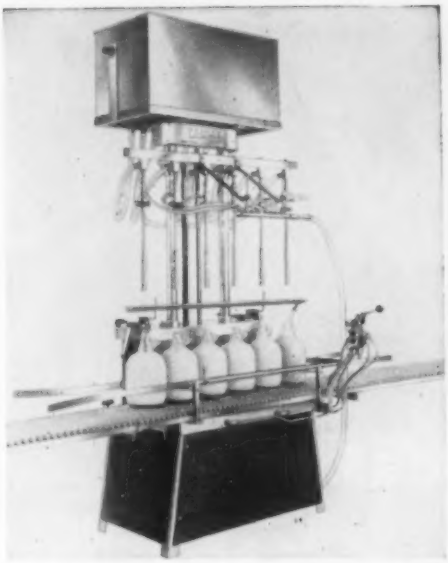
Probably the most universally accepted improvement is in the method

* Vice President, Chisholm-Ryder Co. of Pa., Hanover, Pa.



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This model makes us especially happy—its users even happier! SFRT FILLS FOAMY MATERIAL FOAMLESSLY, with the same speed and efficiency as non-foaming liquids. Adjusts to handle containers up to five gallons.

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Model "A" — Small packager—economy model. Simple installation and easy operation make this a mainstay of many small businesses.

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FULLY AUTOMATIC STRAIGHT LINE FILLER

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of label feeding. Most labeling machines have a relatively small label magazine and, when the label supply needs replenishing, the flow of cans is stopped. However, the trend today is to reduce the number of machine stops, or down times, and this can be accomplished either by providing a larger magazine or by devising a system of feeding the labels without interrupting the continuous flow of cans on the production line.

One manufacturer has developed a larger label bed. All the major labeler manufacturers can supply automatic feeds so that new labels can be stacked into the machine without stopping the flow of cans. This method of continuous feeding of labels definitely smooths out the flow of containers in the whole packaging line and therefore increases the average number of containers handled per minute.

Label-pickup troubles

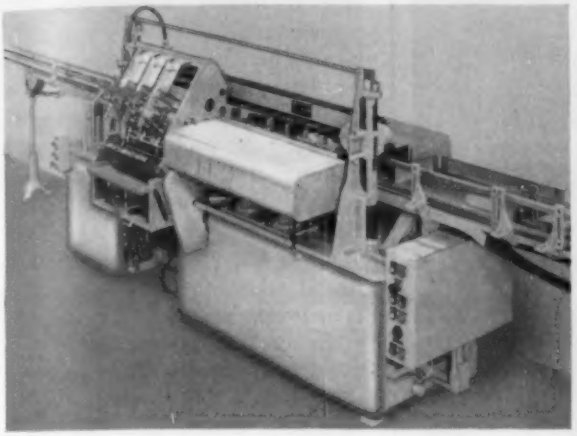
However, in addition to continuous label feeding, a good many other factors control average production. Since the cans pick up a spot of glue and since the glue must be of the proper tackiness to pick up the label, it can be seen that the temperature of the container can readily affect the tackiness of the adhesive, which in turn will vary the effectiveness of label pickup. If wide temperature variations are experienced from one can to another, label pickup may also vary from can to can.

Consequently, most adhesive manufacturers have developed higher-temperature glues, since the greater the difference between the temperature of the cans and the temperature of the glue, the less effect variations in can temperature will have on glue temperature and therefore on the tackiness of the glue. This trend toward higher-temperature glues has called upon the machinery manufacturers to provide higher-temperature glue pots and more accurate thermostatic controls for the average labeling operation.

Higher speeds have also required more and more attention to variations in the labels themselves. The thickness of the label is a good example. Often no attention is paid to variations in thickness of the different colored inks which go to make up a good-looking label. Yet if even distribution of these inks is not maintained, it is entirely possible that one end or one side of

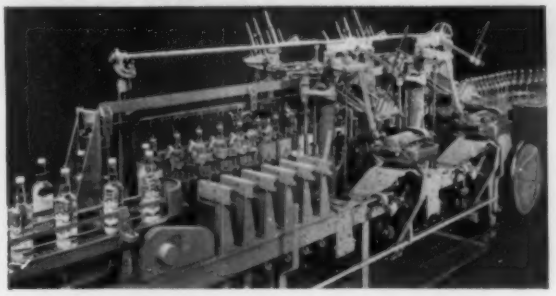
WORLD'S ENCYCLOPEDIA

OF MODERN AUTOMATIC LABELING AND CELLULOSE BANDING



WORLD SUPER C. M. LABELERS

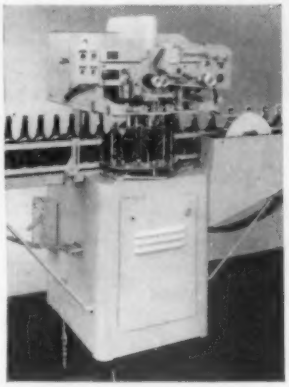
The latest advance in high speed, automatic labeling by the company that has engineered and built more automatic labeling machines than any other company in the world. Applies front; front and back; front and wrap around neck (ketchup) labels simultaneously, when desired, to any size or shape glass container up to gallon capacity. Speeds up to 300 B. P. M.



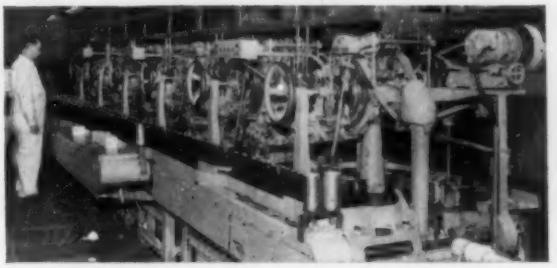
WORLD BEE-LINE LABELERS

for high quality, precision application of body labels (front and back), neck labels, shoulder labels and medallions to round, square, flat, oval or panel glass containers. The *Bee-Line* does the complete labeling job however fancy — *one* machine, *one* operator. It is the Labeler preferred by nationally famous producers of glass packed foods, condiments, wines, spirits, drugs, cosmetics and household specialties. It comes in five models to meet a wide range of needs.

WORLD AUTOMATIC CELLULOSE BANDERS



make banding as precise, dependable, time and labor saving as World automatic labeling. Take the banding material in economical, easy to handle roll form. Apply bands of various diameter, printed bands and precisely spotted bands — 75 to 500 B. P. M.

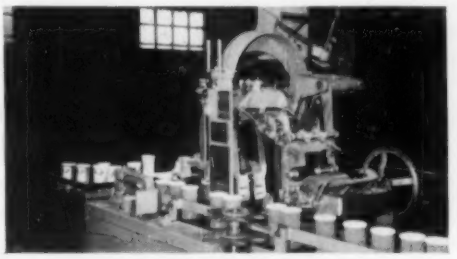


WORLD TANDEM LABELERS

are the standard for high production, low cost labeling of beer, carbonated beverages, and fruit juice bottles. Available with two, three, four, five, six, seven or more labeling units to deliver from 60 to 500 or more labeled containers per minute — body labels, neck labels and foil, as desired. Automatic feed control. One-man operation.

WORLD TURRET LABELERS

for economical, dependable, high quality application of body labels and neck labels or neck bands. Used for labeling many of the finest products packed in glass. Available in Uni-Turret and Twin-Turret models for 60-140 per minute labeling of containers from 1″ to 4″ dia., 3″ to 13″ high.



WORLD LABELERS

ECONOMIC MACHINERY COMPANY

40 FREMONT STREET, WORCESTER 3, MASSACHUSETTS

DIVISION OF GEO. J. MEYER MANUFACTURING CO.

CUDAHY, WISCONSIN, U. S. A.



The Horix principle of liquid filling is adaptable to almost every type of container.

A *single* Horix machine for example is being used to fill prune juice, vinegar, jelly and preserves into 13 different size containers, including bottles, tumblers, jars and cans. This economy of multiple use of machinery is something you might consider in your own production line set-up.

No matter what product or container handled, Horix guarantees

- extreme accuracy of fill
- no product waste
- positive container handling
- no overflow return system
- no container—no fill
- no collapsing of containers
- low maintenance
- quiet operation

HORIX MAKES FILLERS FOR LARGE OR SMALL PRODUCTION

Bulletin No. 155-0 describes entire line of high-speed automatic rotary fillers; semi-automatic straight-line gravity bench type fillers; and compact portable vacuum fillers. Write for copy today.



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FILLERS AND CONVEYORS

Lowest Unit Filling Cost—Highest Product Quality

the label may be thicker than another. When this difference is multiplied a thousand times (labels are stacked in packs of about 1,000), the top label on a stack will not lie flat and therefore will not be easily picked up by the can which rolls over it.

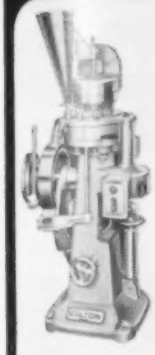
The trimming of the width of labels is also very important and should be held to a very close tolerance from pack to pack and throughout any one pack. The labels are guided up in the labeling machine between guide rails and, if one pack of labels is too wide and the next pack too narrow, proper guiding of the labels onto the cans cannot be assured in the label application.

Other factors also affect label pick-up. If labels are used while the ink is not yet dry, they tend to stick to each other and cause erratic pickup. Labels should always be stored flat so that they will lie flat in the label magazine. If they have curled up for some reason, they should, if possible, be flattened out by weights before use. Lacquers on the label sometimes make labels stick to each other (the printer's term for this is blocking) and the proper grade of lacquer should be used to prevent this. Even the grade of paper and the grain of paper will affect label pickup and, therefore, production speeds.

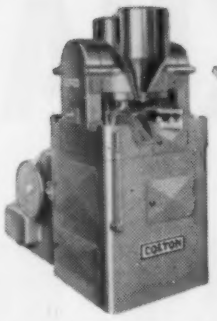
Packers who handle large runs of any one size of container sometimes purchase a nonadjustable labeler that is fitted specifically for one size. Since there are fewer adjustments to get out of line, it is often easier to perform the labeling operations and it is impossible for an overzealous operator to turn handles before he is sure what particular problem has caused the variation.

Probably the main concern of most operators, however, is to keep the flow of cans at a steady rate. They know that running in fits and starts does not add up to a large number of cases of the product at the end of the day. They know that steady label feeding, uniformity of label pickup and uniformity of a good grade of labels keep the labeler running smoothly. They also know that clean and well-adjusted machines will work toward that end. But no matter how steadily the labeler is running, if the cans are not being fed to it uniformly and the machine following it is not taking them away steadily, good production records cannot be achieved and consistently maintained.

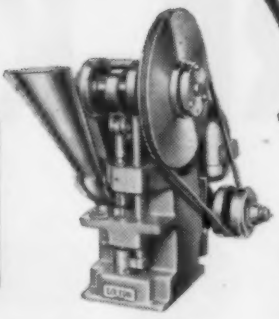
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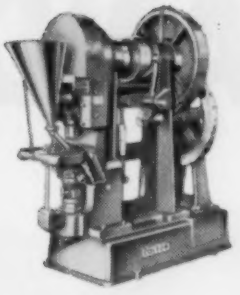
TABLET PRESSES. Double Rotary—Nos. 227; 233; 241; 260. Up to 2900 tablets per min. Up to 1¾" tablet dia.



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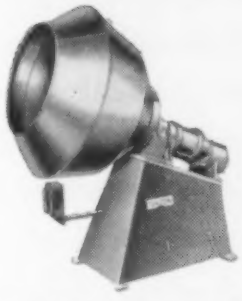


TABLET PRESSES. Single Punch, Heavy Duty—Nos. 345; 350; 360. Up to 85 tablets per min. Up to 3" tablet dia.

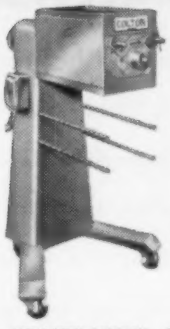


TABLET and CAPSULE COUNTERS—No. 715 Single; No. 705, 5-Bottle; No. 710, 10-Bottle.

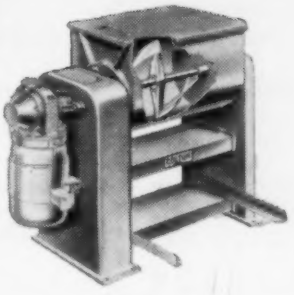
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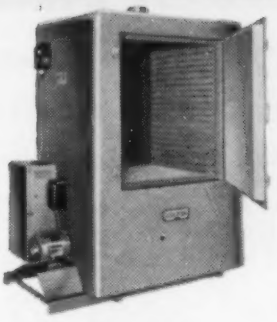
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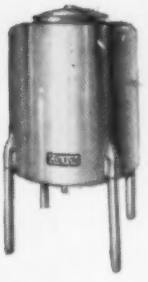
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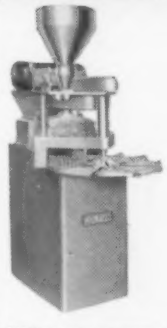


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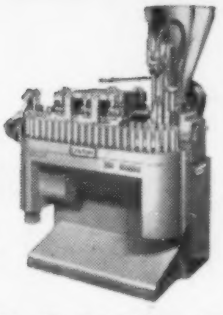
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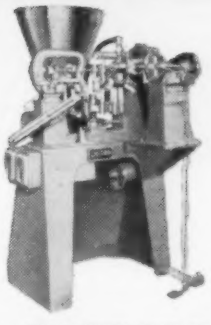
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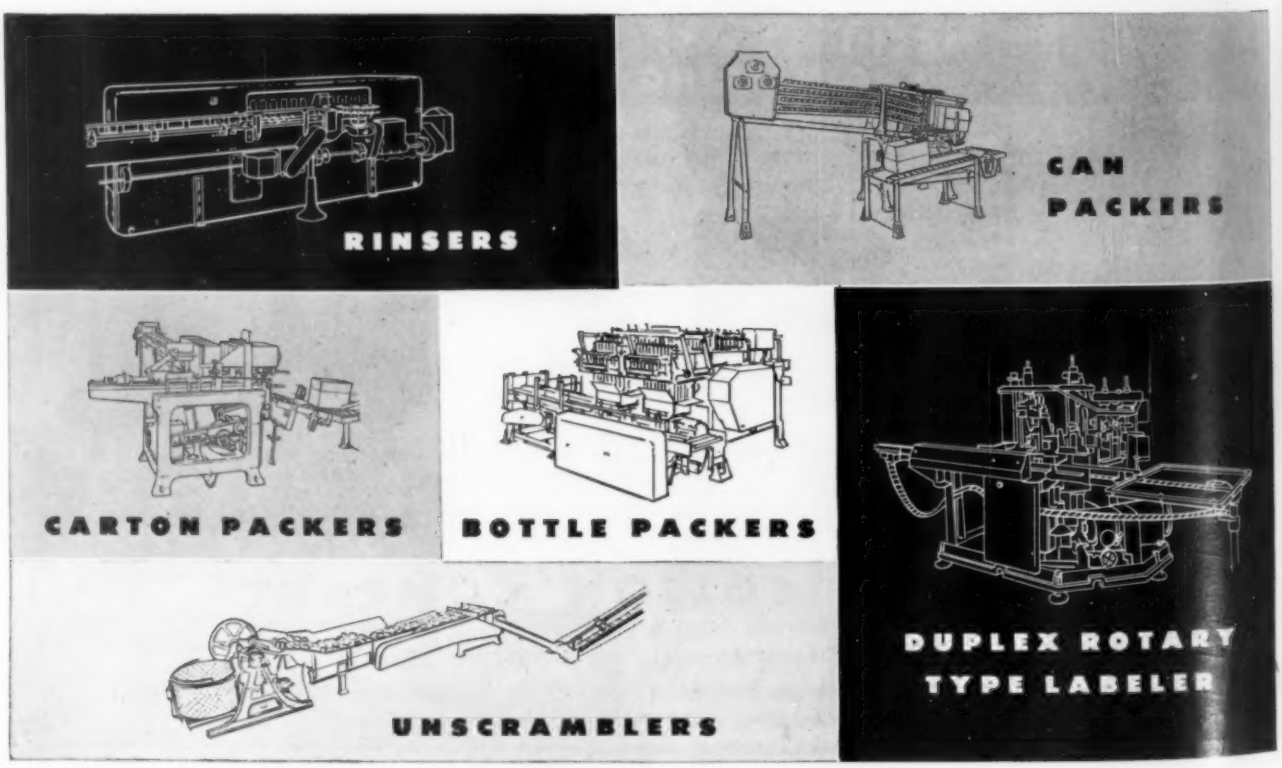
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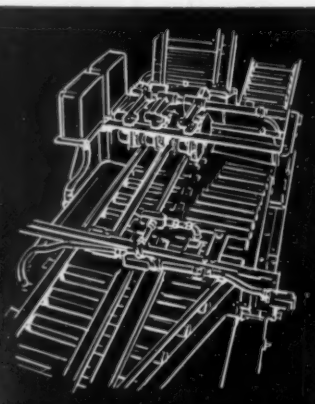
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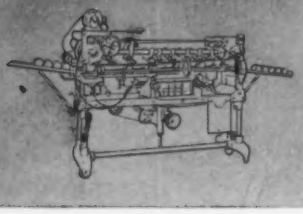
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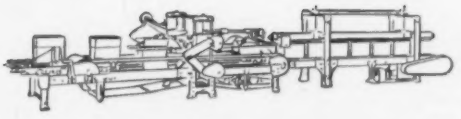
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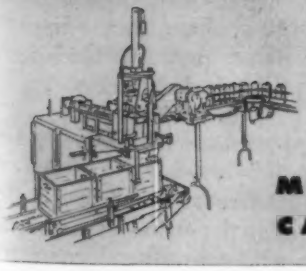
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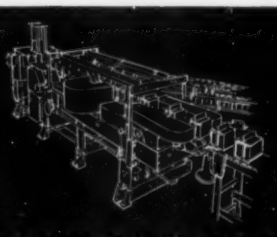
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SIX-PACK CAN CARTONERS

Cartoning equipment

by E. A. SIEBERT*

Cartoning equipment as discussed in this article is equipment used to place a solid item or an assembly of solid items into an end-opening folding carton. Also discussed are machines that perform some of the cartoning operations and those used merely to close a carton after it has been hand packed.

The products handled by this type of machinery are, in the main, solid or semi-solid. Among the many different kinds of units handled are toothpaste tubes, glass bottles and jars, tins, bars of soap, meat pies, prints of mince meat and assemblies of articles such as stacked razor blades, decks of cards and stacks of facial tissues.

By far the largest percentage of cartons handled by cartoning equipment are standard reverse-tuck cartons. Other styles include straight-tuck cartons and those with glued ends. Frequently cartons with cellophane windows and partitioned cartons are handled both on fully automatic and on semi-automatic machines. Sometimes on larger cartons the bottom tucks are slit at the sides so that they will lock to the side flaps for greater security.

The machinery the packager will choose will depend on the volume of his production, the physical nature of his product, whether he has one or more items to package, the protection he requires for his product, the manner in which he wants it merchandised and the number of different sizes of packages involved.

Types of machines

The fully automatic cartoning machine in its basic type has an intake conveyor consisting of a series of pockets and is equipped with a magazine into which stacks of cartons in collapsed form (just as they are received from the carton manufacturer) are loaded. Items to be cartoned are placed by an operator, or operators, into the individual pockets of the intake conveyor. The cartoning machine feeds a carton from the magazine, expands it into shape, inserts the item or items comprising the unit pack, then closes the carton by folding and tucking in the end flaps, or by folding and gluing the end flaps in place.

This type of machine is usually employed for products whose physical nature requires that they be hand loaded into the machine, or where the packaging operation does not justify expensive automatic means for getting the product into the conveyor pocket. Included in the many items handled by this simpler type of fully automatic cartoner are toothbrushes, pen points, tubes of toothpaste, ampuls, playing cards, long-cut macaroni and pies.

The fully automatic cartoning machines for handling bottles, jars, vials and similar units are basically of the same design as the machine described. Added, however, are means for taking the unit to be cartoned directly from the machine, usually the labeling machine, which precedes it on the packaging line. This cartoning machine is equipped with an intake belt onto which the items to be cartoned are automatically discharged. A timing mechanism is provided with a transfer wheel that gradually lowers the item into a horizontal position and into a pocket of the intake conveyor.

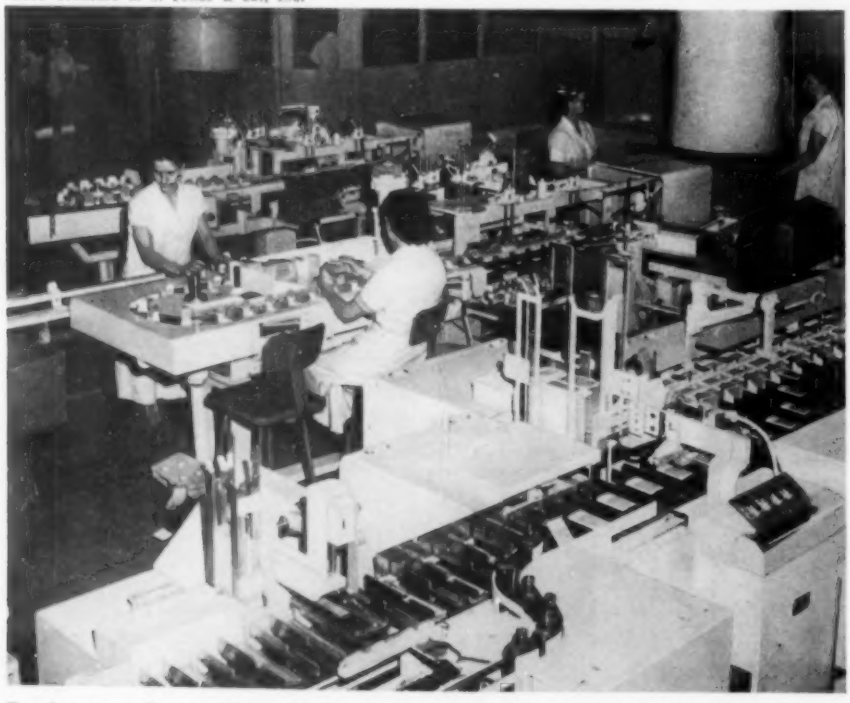
Many products require that additional pieces or inserts be packaged in the carton with them. Some inserts must be placed alongside the product by operators, but many can be automatically fed from hoppers or magazines. A mechanism can be furnished which will feed an information sheet from a magazine in its flat form, give it the proper number of folds, and place it on or around the product in the conveyor pocket so that it will be inserted into the carton along with the product. Other pieces which can be machine inserted are corrugated liners, special booklets and eye droppers in spiral-wound enclosures.

The fully automatic machines can also be equipped so that they will print on the carton side or end panels. They can be built to include devices that will apply strips or spots of glue to the tuck-in portion of bottom end flaps of cartons. This is done where the carton must support relatively heavy products. Mechanisms are also furnished to detect unfilled cartons on the packaging line.

Some products can be handled in a fully automatic operation with slightly different methods of introducing them into the cartoning machine. For example, pre-wrapped groups of crackers

* Vice President, F. B. Redington Co., Chicago.

PHOTO COURTESY R. A. JONES & CO., INC.



Semi-automatic cartoning (background) and fully automatic unit (inserting product, leaflet and postcard) provides a versatile, high-volume set-up.

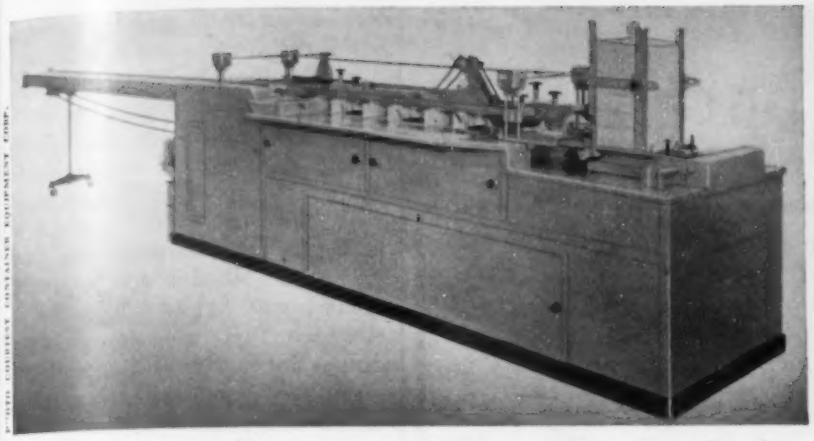


PHOTO COURTESY JOHNSON EQUIPMENT CORP.

This adjustable horizontal cartoner sets up cartons and closes them after the product is manually inserted. The machine can handle tuck- or glue-end styles.

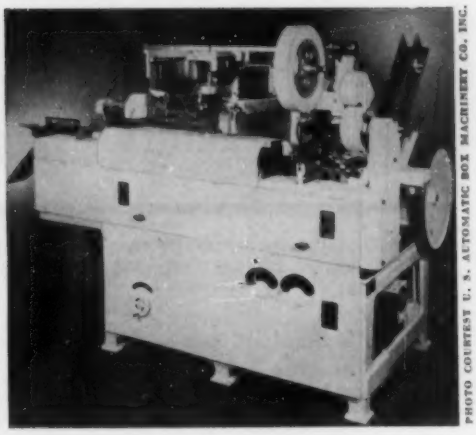


PHOTO COURTESY U. S. AUTOMATIC BOX MACHINERY CO., INC.

This specialized unit forms, fills and closes 5- and 10-cent candy packages.

and cookies can be fed directly from the wrapping units through a series of accumulator belts (if the output of more than one wrapper is to be packed on a single cartoner), gathered in the proper numbers and cartoned automatically.

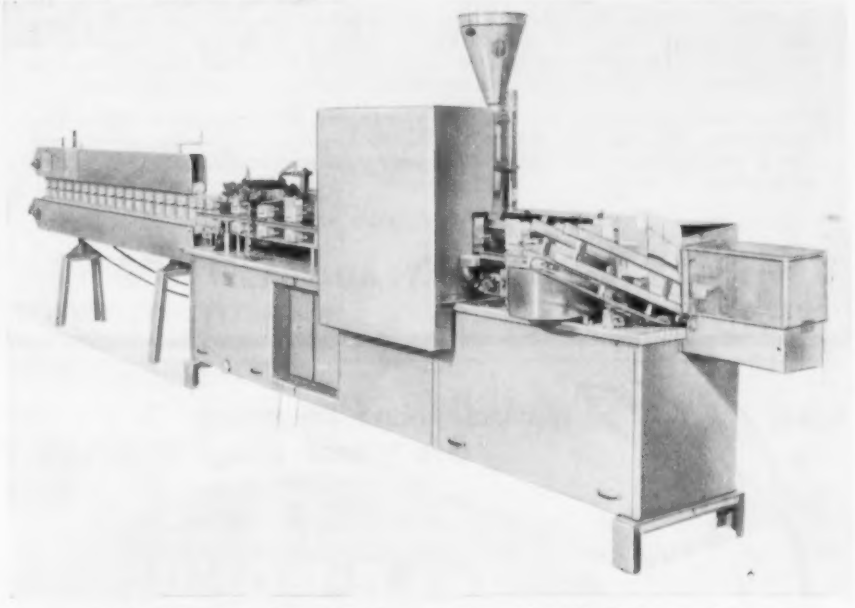
Many other products can be fed into the cartoning machine through the use of chutes, hoppers and magazines–for example, razor blades, birthday candles, crayons, pencils, playing cards, free-flowing candies and candy-coated gum. One such machine, feeding candy-coated gum from a hopper through the proper number of chutes, places 12 pieces of gum in each pocket of the article conveyor. The machine then feeds a carton from the magazine, forms it, inserts the 12-piece product unit and closes the carton by tucking in the end flaps. The cartoner is directly connected with a machine that overwraps the carton with a protective jacket of cellophane.

In the case of rolls of film, rolls of bandage, bars of soap and prints of mince meat, there are fully automatic dual-sequence units that will wrap the product and then insert it.

Cartoning machines are frequently built today to handle display or shelf cartons. They are provided with accumulators for taking the output of one or more machines that produce the individual retail package. They group these packages in the proper count and arrangement and insert them into the display or shelf carton automatically. Usually the ends of the carton are glued. Sometimes the long seam is spot glued so that the top of the carton can be opened easily by the retailer and folded back to form a display panel.

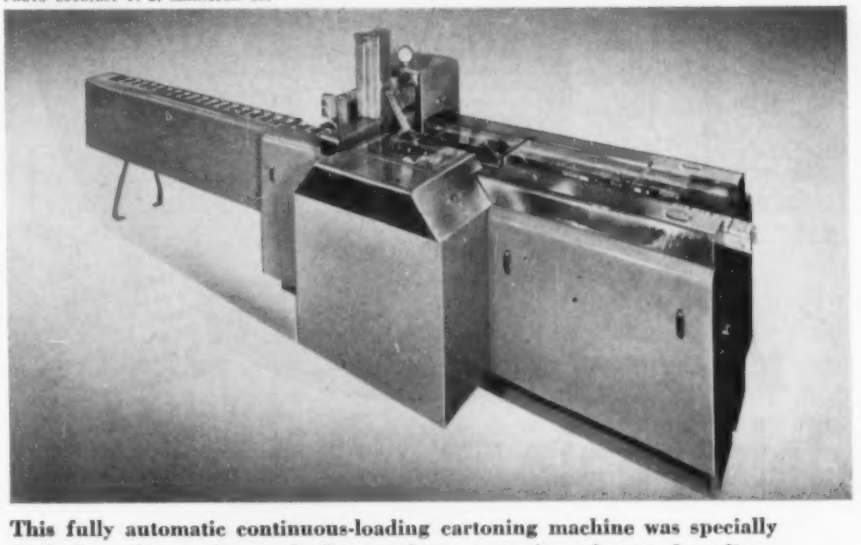
Similar types of fully automatic

PHOTO COURTESY REX PACKAGING MACHINE CO.



A vacuum-feed system gives wide range of speeds—20-180 per minute—to this semi-automatic cartoning machine handling a range of small cartons.

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This fully automatic continuous-loading cartoning machine was specially built for a big packer to facilitate volume cartoning of canned sardines.

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machines are those used by packagers of cough drops and similar products like the licorice lozenges and chocolate-covered peanuts packaged in small 5-cent cartons. The simpler models of this type of machine feed a carton in collapsed form from a magazine, expand it, set it upright in a pocket of the conveyor and then close the bottom end. The proper product unit, fed from a hopper, is measured (not weighed) and the cartons are filled as they move along under the hopper mechanism. Then the top of the carton is closed.

More complex machines handle the carton in the same way, but are equipped with a mechanism that cuts a sheet of waxed paper from a roll, forms a liner and places it into the carton. As the lined cartons pass under the hopper, they are filled. There is one other difference as well, in that the cough drops or candy pieces are always counted. Actually they are agitated into the holes of a plate for an accurate count. As the top of carton is closed after filling, the liner is also closed and tucked in with it.

The so-called semi-automatic machines are those which will feed a carton from the magazine, form it, tuck the bottom end and move it, with the top held open, on a conveyor. The product is then placed into the cartons by operators, after which the machine automatically closes the top of the carton. Vertical cartoning machines are available that handle tuck-in cartons only. A somewhat similar machine maintains the cartons in horizontal position and glues them after they have been manually loaded.

Another type of semi-automatic machine takes the flat carton, forms it, tucks one end and discharges the carton. Operators then load the carton and close the top flap. Separate machines can be furnished that will automatically close the top end flap.

Another machine in rather wide use is one that merely folds over the end flaps and closes the cartons. The carton is set up by hand, filled by hand and placed on the intake line of the machine that glues and closes it.

Machine flexibility

Fully automatic cartoning machines are generally used for the packaging of products that have a constant and high volume. Many machines are built for handling one size of package only and are not adjustable. With the increase in cartoning speeds, however,

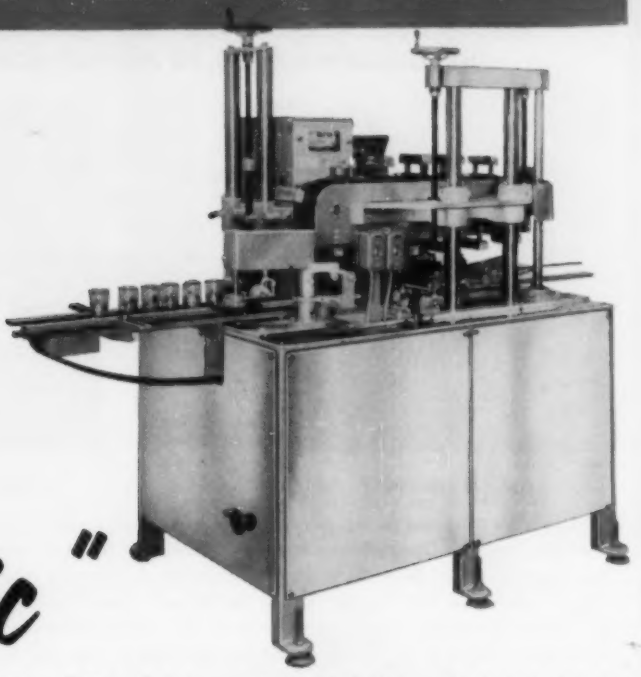
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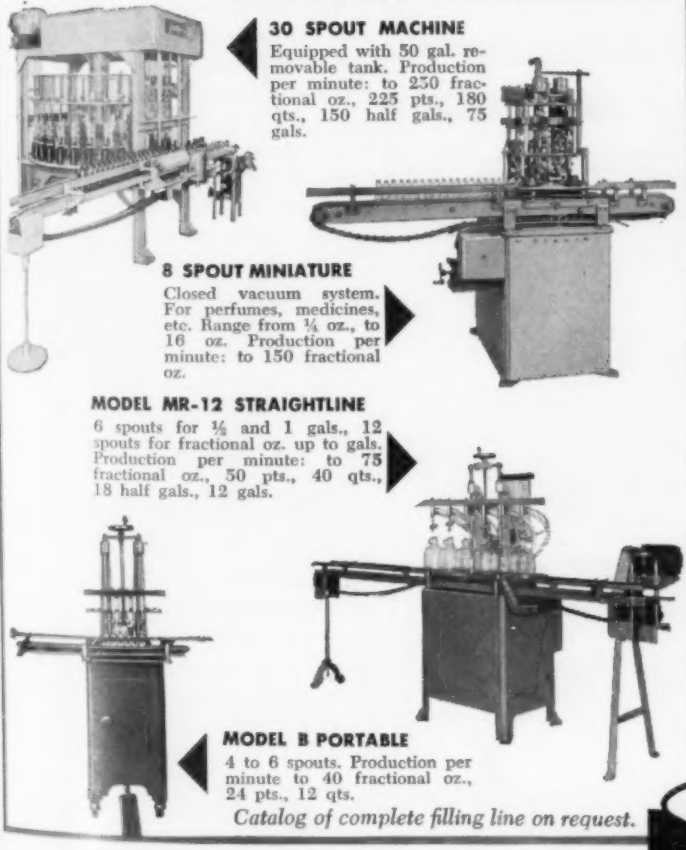
NO EXPENSE changeover parts at an absolute minimum. 90% *less* than other makes.

EFFICIENCY perfect registration on flat, curved and recessed surfaces. No oozing of glue whatsoever.

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Write for complete details.

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30 SPOUT MACHINE
Equipped with 50 gal. removable tank. Production per minute: to 250 fractional oz., 225 pts., 180 qts., 150 half gals., 75 gals.

8 SPOUT MINIATURE
Closed vacuum system. For perfumes, medicines, etc. Range from ⅛ oz., to 16 oz. Production per minute: to 150 fractional oz.

MODEL MR-12 STRAIGHTLINE
6 spouts for ½ and 1 gals., 12 spouts for fractional oz. up to gals. Production per minute: to 75 fractional oz., 50 pts., 40 qts., 18 half gals., 12 gals.

MODEL B PORTABLE
4 to 6 spouts. Production per minute to 40 fractional oz., 24 pts., 12 qts.

Catalog of complete filling line on request.

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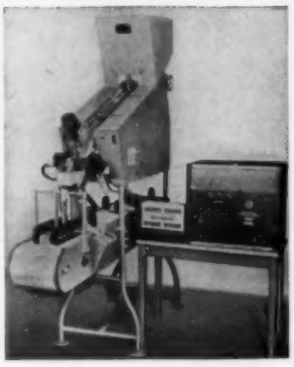
Package by Count to 300,000 Parts per Hour

AUTOMATICALLY COUNTS AND PACKAGES ACCURATELY THE FOLLOWING PARTS, TO ANY SET QUANTITY



NUTS
SCREWS
WASHERS
LOCK WASHERS
ROOFING NAILS
DOWELS
STUDS
RIVETS
EYE SCREWS
BUSHINGS
ELECTRICAL PARTS
MOLDED PARTS
TABLETS
PILLS
CAPSULES
BUTTONS
CANDIES
COATED GUM
SINTERED PARTS
MACHINED PARTS
PLASTIC PARTS
BALLS
DISCS
RUBBER PLUGS

And a Variety of Other Objects



Count-O-Matic E

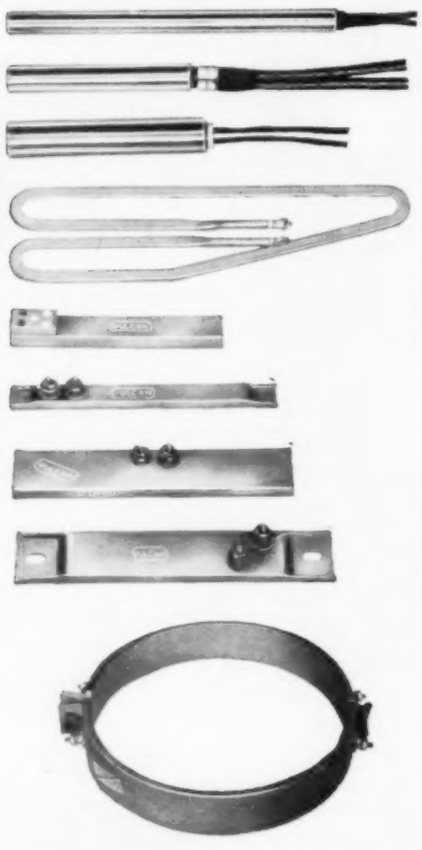
Count-O-Matic A

These versatile machines, or one of our smaller models, will solve your counting and packaging bottlenecks instantly. One machine can handle the complete range of products of many industries. The COUNT-O-MATIC feeds the product continuously into alternate receptacles which are automatically positioned and removed by the electronically synchronized conveyor. Unskilled labor can operate this machine. It can be set up for a different size product in 5 to 10 minutes. A turn of the dial on the electronic control panel sets the quantity to be counted.

U. S. ENGINEERING COMPANY

40-22 22nd Street **Long Island City 1, N. Y.**

PRECISION PACKAGING BEGINS WITH PRECISION HEATING



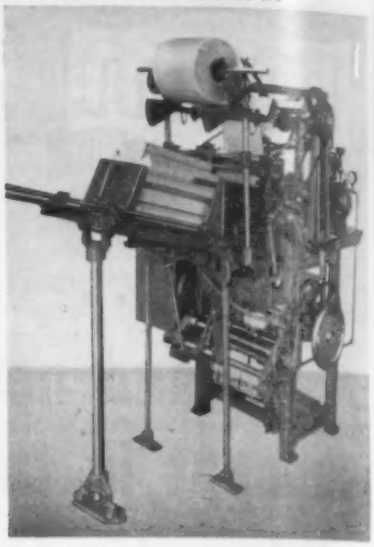
. . . and compact, efficient Vulcan Heating Units are operating all over the world in machinery or equipment for the packaging and sealing of everything from bread to cigarettes, from spinach to frankfurters.

Some of the many available types shown at the right include, from top to bottom . . . cartridge, tubular, flat or strip, and band type heaters.

Write for free, eight page catalog describing Vulcan Elements in greater detail.

VULCAN ELECTRIC CO.
Danvers 30, Mass.

PHOTO COURTESY PETERS MACHINERY CO.



Unit for handling lard, cookies, doughnuts, etc., cartons them and lines cartons at 3,000 an hour and higher.

the number of machines built adjustable for more than one size is increasing. Many handle three or four different sizes. Some handle as many as eight or nine and even more. Generally, all the packages contain the same or a similar product. The difference is in package size.

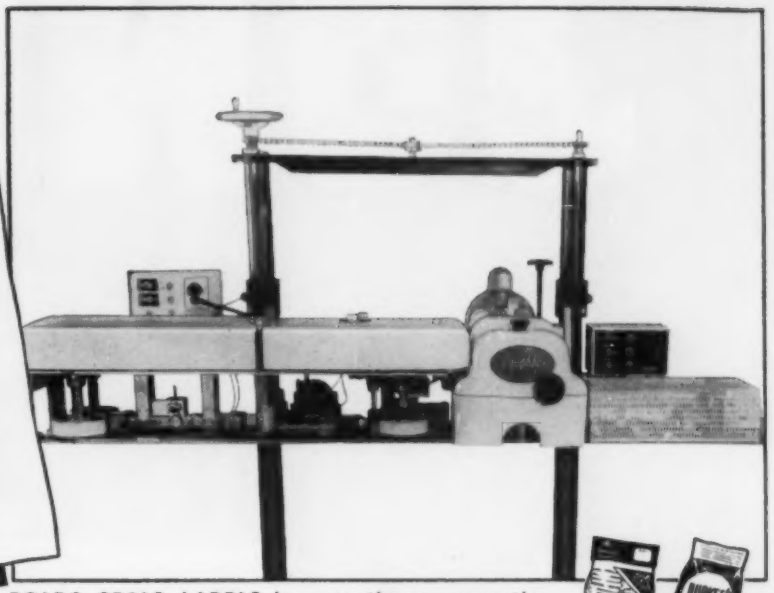
The fully automatic cartoning machine is factory set and tested for the number of sizes it is to handle. It can readily be changed from one size to another. While the difference in size between the largest and the smallest package often is considerable, the range of adjustability does not approach that of semi-automatic units.

With the aid of machinery manufacturer's engineers, fully automatic cartoning machines can be set and tested in the user's plant for additional carton sizes even years after the machine has been built. In general, however, the new sizes to be accommodated may be neither smaller than the minimum nor larger than the maximum size for which the machine was built.

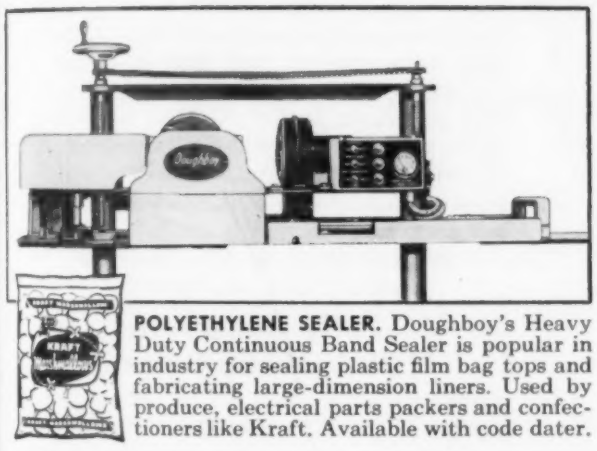
In addition to the lower price of a semi-automatic cartoning machine, there are many reasons for its continued use; outstanding among them is its extreme flexibility in the wide range of carton sizes which it can handle. These machines are built with minimum and maximum size limitations. However, the user readily gains experience, so that he can easily adjust his machine for any size of carton

(This article continued on page 452)

WORLD'S MOST COMPLETE LINE OF HEAT SEALERS!



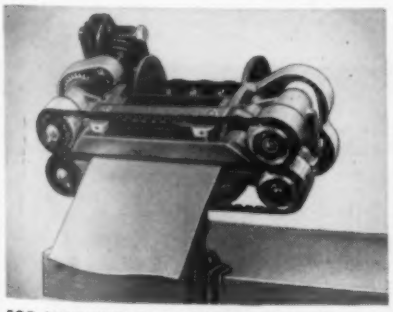
FOLDS, SEALS, LABELS in a continuous operation. Doughboy's Automatic Sealer-Labeler (Model AT-L) seals cellophane bag tops, then applies thermoplastic label over seal to give a crimp-free appearance for companies like Nabisco and Durkee Foods. Has capacity for 65 or more bags per minute.



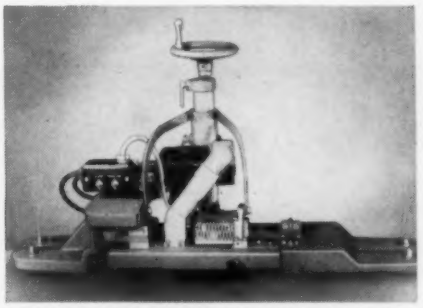
POLYETHYLENE SEALER. Doughboy's Heavy Duty Continuous Band Sealer is popular in industry for sealing plastic film bag tops and fabricating large-dimension liners. Used by produce, electrical parts packers and confectioners like Kraft. Available with code dater.



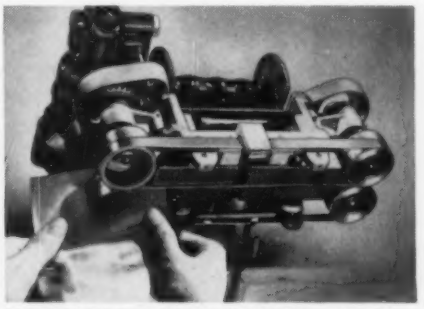
HIGH SPEED PRODUCTION. Doughboy's Rotary Heat Sealer (Model AT-C) with code dater handles wide range of sealing materials at super speeds—up to 90 bags per minute. A favorite with famous food producers like Lay's and Frito.



FOR MOISTURE BARRIERS. Doughboy's Power Hand Sealer (Model PHS-B) weighs only 6 lbs. 12 oz. yet assures continuous dwell and rapid seal. Uses efficient rotary sealing principle.



LOW COST SEALING. Doughboy's Utility Band Sealer (Model BD) offers big machine advantages for sealing polyethylene. The ideal unit for intermediate packaging requirements. With set speed.



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PLUS...a complete line of versatile belt conveyors!

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JONES



FULLY AUTOMATIC Constant Motion CARTONERS

MAXIMUM DOLLAR PROFIT from a cartoning machine depends not on original cost, but on:

1. **Ability to keep pace — regardless of line speed.**
2. **Freedom from costly downtime, maintenance and repair.**
3. **Ready convertibility to a wide range of sizes without compromising efficiency.**
4. **Special attention, in design and construction, to your individual products and cartons.**

Comparison will prove that a Jones Constant Motion Cartoner is unequaled for highly profitable operation.

Let us tell you where you can see a Jones Constant Motion Cartoner loading your type of product.

Bottles, jars, and most other products are received automatically by the cartoner.

Extended bucket conveyor is available for products requiring manual transfer.

OPERATIONS

Feed and open cartons; insert single or multiple loads; glue or tuck flaps of cartons – airplane or reverse tuck.

Fold and insert leaflets, booklets, corrugated liners; print or stencil code; are convertible to different sizes of cartons and loads.

Feed and count small articles from hoppers and magazines.

SPEEDS: *25 up to 300 cartons per minute with one operator.*

JONES Fully Automatic NOVA Motion Cartoners

Accumulate and load 5, 10, 12 or more cartons or products into master carton.

JONES CARTONERS HANDLE MILLIONS OF CARTONS DAILY, CONTAINING:

BOTTLES (UP TO 32 OZ.)
VIALS (1 CC TO 120 CC)
AMPOULES
JARS
TUBES
RAZOR BLADES
BLADE DISPENSERS
TINS
CANS
FACE POWDER, BOXES
BAR SOAP
LIPSTICK
HAIR RINSE
HOME PERMANENT KITS
SODA CRACKERS
GRAHAM CRACKERS
COOKIES
FRUIT PIES
FROZEN PIES
POWDERED MILK
CANDY BARS
MUFFETS
SHREDDED WHEAT
BOUILLON CUBES
PIE CRUST MIX
CANDY-COATED GUM
CANDY MINTS
FRUIT BAR
YEAST
MATZOS
SPAGHETTI DINNER
CANDY CIGARETTES
LICORICE CIGARETTES
LOZENGES
FACIAL TISSUES

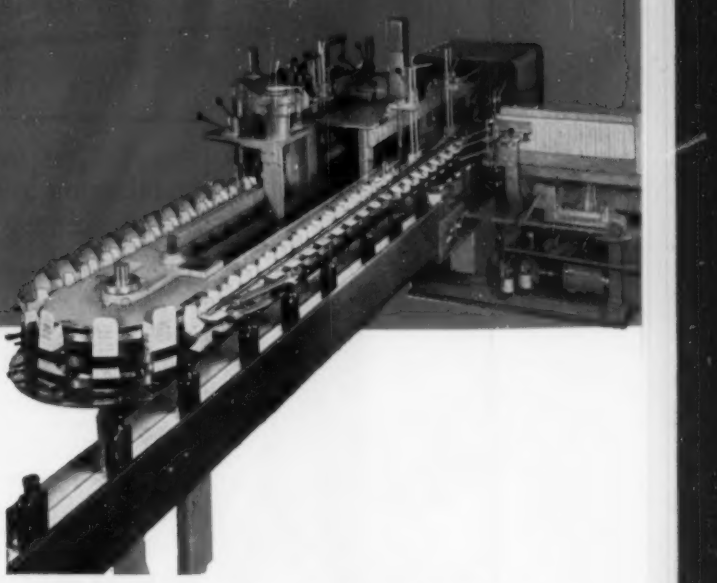
R. A. JONES & COMPANY, INC.

Cartoning Machines – Soap Presses

P. O. BOX 2055

JONES

"CMV" CONSTANT MOTION VERTICAL



The CMV takes the flat carton (reverse or airplane tuck) from magazine, opens the carton, tucks bottom flaps, conveys the open carton past manual loading stations, tucks top flaps and delivers the loaded carton.

TWO MODELS, quickly adjustable within the following ranges of carton sizes:

MODEL 4— ½ x ¾ x 2¼ inches up to 3¼ x 3¼ x 8 inches

MODEL 5— ⅞ x 1 x 2 1⅜ inches up to 4¼ x 4¼ x 9 inches

Change to different sizes is made in mere minutes — without special tools or skills.

SPEEDS: *25 to 120 cartons per minute.*

Since an operator inserts a load with each hand, one operator easily produces 50 to 70 finished cartons per minute on one-piece loads. For higher speeds or multi-piece loads, the standard models provide loading stations for as many as five operators. Special length machines are available if more than five operators are needed.

Independently driven conveyors are available for infeed thru center, or along one or both sides of machine. Discharge conveyor can be lengthened to serve as packing belt.

JONES CARTONERS HANDLE MILLIONS OF CARTONS DAILY, CONTAINING:

PAPER NAPKINS
WRAPPED MINTS
VENO-PAK
CIGARS
ROLL FILM
MOVIE FILM
ROLL CAPS
SANITARY NAPKINS
SANITARY TAMPONS
PAPER PLATES
STEEL WOOL PADS
GAUZE BANDAGES
ABSORBENT COTTON
ADHESIVE BANDAGES

DISPOSABLE SYRINGES
SNUFF
DEODORANT CAKES
ELECTRIC SWITCHES
ELECTRIC RECEPTACLES
PIPE TOBACCO
MASKING TAPE
FRICTION TAPE
ZIPPERS
COMBS
STOVE WICKS

SEALING WAX
PARAFFIN CAKES
CIGARETTES
DYES—CAKE & ENVELOPE
JAR RINGS
JAR LIDS
CO_2 CYLINDERS
AUTOMOBILE THERMOSTATS
IGNITION PARTS
NURSING NIPPLES
Q-TIPS

CINCINNATI, OHIO

R. A. JONES & COMPANY, INC.

Cartoning Machines — Soap Presses

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THE NEW PLASTIC FILMS

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1 Are you aware of all the ways in which plastics can improve your product?

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You *should* be able to answer "yes," because plastics are constantly growing in importance. If you manufacture or package a product, chances are plastics can profitably be put to use in your business.

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within its maximum and minimum range. Usually there are scale markings for knob-end levers to loosen parts for moving and adjustment.

Semi-automatic machines are suitable for use by small-volume producers and they are also valuable to large-volume producers who want stand-by machinery.

Many cartoners of this type can be provided with various attachments, including (1) casters so that the machine can be moved from one packaging line to another, (2) means for spot gluing the bottom tuck flap so that heavy bottles will not drop through and (3) devices for coding —with an ink imprint or by pressing steel type into the carton board.

Output and efficiency

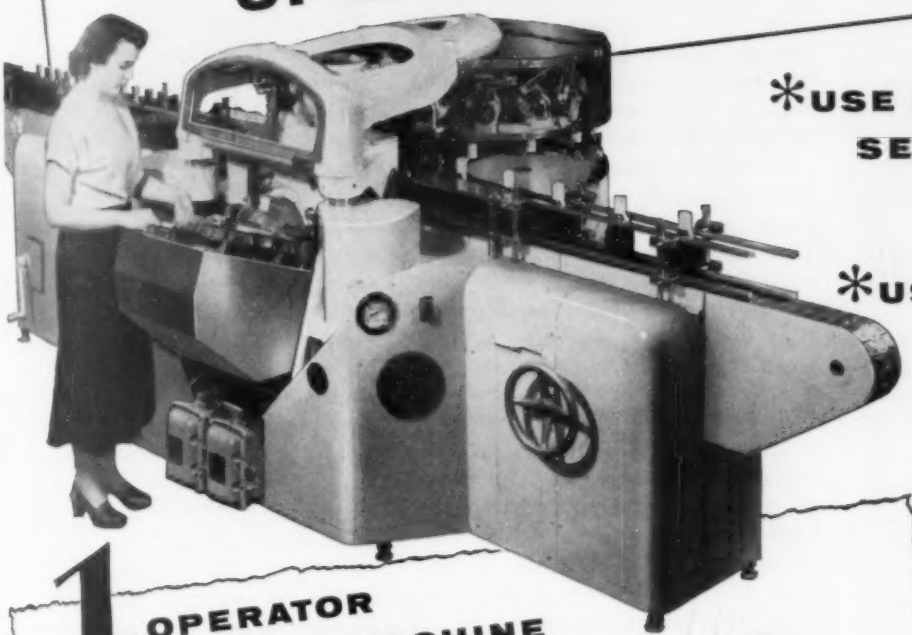
One advantage of the fully automatic cartoning machines, of course, is minimum use of labor. For example, in the cartoning of bottles only one operator is necessary and her duties are merely to keep the carton magazine filled and generally to supervise operation. Furthermore, the fully automatic machine can produce considerably more packages per minute, particularly in the smaller sizes, than a semi-automatic machine.

Fully automatic machines can produce more intricate packages, some of which would be entirely impractical for production on semi-automatic units. For example, assume a production line for a package consisting of a carton, a bottle, a corrugated protector and a circular, that is operating at a speed of 100 cartons a minute. With a fully automatic cartoner one girl can handle the entire operation. With a semi-automatic machine, as many as five girls would be required.

The maximum speed usually obtained on a semi-automatic machine is 120 per minute and often it is operated at somewhat lower speeds.

The speeds of fully automatic cartoning machines vary considerably, depending on the size of package, the number of items to be cartoned and the kind of product, as well as the machine itself. However, fully automatic machines are rarely operated at speeds of less than 100 cartons a minute. They generally operate on bottle-cartoning lines in the neighborhood of 120 a minute, but rates of 200 or more a minute are not unusual, especially on smaller-size bottles, and rates of 300 or more a minute have been reached.

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*USE CELLULOSE SEALS

*USE *Gisholt* AUTOMATIC SEALING MACHINE

1 OPERATOR PLUS THIS MACHINE CAN COMPLETELY MECHANIZE YOUR PRESENT BOTTLING LINE!

THERE's no longer any need to have a *partially* mechanized bottling line. Here, one machine with one operator can handle the complete job of applying your cellulose neck band seals. It's automatic sealing for ½ pint, pint, fifth and quart sizes, flat or cylindrical bottles, with quick changeover. And this *one machine*, with its adjustable speed, can fit into the fastest bottling lines in the world.

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Wrapping and bundling machines

by OTTO HALBACH*

This article deals with those machines that apply readily removable wrappers known as "loose wraps" to individual products or packages, or to groups of such packages to form and wrap them in bundles.

Most packages now on the market can be accommodated very satisfactorily on wrapping machines either in existence or under development. Regular-shaped packages, such as cracker cartons or trays, cigarette packages, standard wrap packages for loaves of bread, frozen-food packages, razor-blade cartons and packages having flat panels against which folding and sealing can be done, pose no problem for standard machines.

When the product or the package is not uniform enough for machine wrapping, a flat card or shaped piece of paperboard like a U board, a collar or a tray may be used to permit machine application of the recommended wrapping material. Individual or multiple candy bars, baked goods, soft goods, delicatessen meats and some fresh produce are typical of the products generally requiring some paperboard component.

Three basic procedures may be used in wrapping packages.

1. *Manual wrapping.* In this case the wrapping material is purchased either in pre-cut form ready for use, or in roll form, to be cut to size by a slitting machine, which also can apply glue for sealing. The operator applies the wrapper to the package manually and seals it with glue or uses a standard heat-sealing device.

2. *Semi-automatic wrapping equipment.* Such equipment requires the operator to do part of the wrapping by hand but multiplies his productivity by performing the most tedious and time-consuming part of the job.

3. *Fully automatic wrapping machinery* generally is the logical choice where production requirements are high. Such equipment takes the unwrapped package at the infeed end and automatically performs all operations necessary to discharge a completed package.

Automatic wrapping machines

Machines in this category may be defined as those which produce standard package forms at medium to high speeds; are readily adjustable for varying sizes of packages; are sufficiently flexible to wrap a series or family of related items, and by virtue of industry-wide use are relatively low in price.

Most of these machines employ wrapping principles which have been accepted for many years. The package generally is fed into the machine at one level and then lifted by means of a reciprocating elevator through an automatically timed sequence of positioning and wrapping. The lengthwise overlap of the wrapper is sealed against the bottom of the package. End folds are either turned underneath the package and sealed against the bottom or are folded and sealed against the package end panels. Wrapped cartons, loaves of bread, bacon packages and trays of bakery goods are formed in this way.

Other standard machines achieve similar results without elevators by using intermittently rotating pockets or tumble wheels, which allow several folding operations to be performed at a single station. Use of these machines is confined to the wrapping of small, uniform products such as chewing gum sticks, soap tablets, cigarettes and chocolate bars, where contour-conforming wrapper application, high speed and frequently the use of multiple wraps are necessary.

A third standard type of machine carries the packages through all operations in one horizontal plane and has an L-shaped folding line which makes the wrapper, folds and seals on the two ends and one edge of the package, leaving the two face panels unobscured by material overlaps. Machines of this type are used to outer wrap cigarette packages, razor-blade cartons, cartons of cough drops and many other small, rectangular packages at relatively high speeds.

Easy-opening devices

Most manufacturers of automatic wrapping machines have available as optional equipment, units which are installed integrally with wrapping machines to make the contents of the package easily accessible to the consumer. These package-opening devices may be divided into two types:

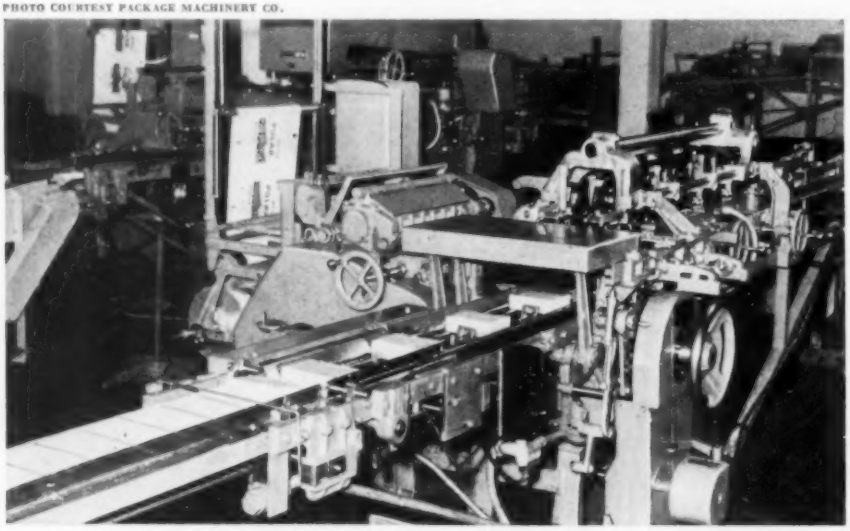
The wrapper itself may be folded, sealed, notched or perforated so that the consumer can open the package or remove the wrapper quickly and conveniently. Another method of providing access to a package is by adding supplementary material in the form of a band, thread, tape or strip.

Printed materials

Advances made in recent years by the converters of wrapping materials with regard to both fidelity of reproduction and the number of colors

* Research Div., Equipment Section, Package Machinery Co., East Longmeadow, Springfield, Mass.

PHOTO COURTESY PACKAGE MACHINERY CO.



This high-speed wrapping machine for use with continuous-motion frozen-food fillers is designed to meet the industry's modern large-scale needs.

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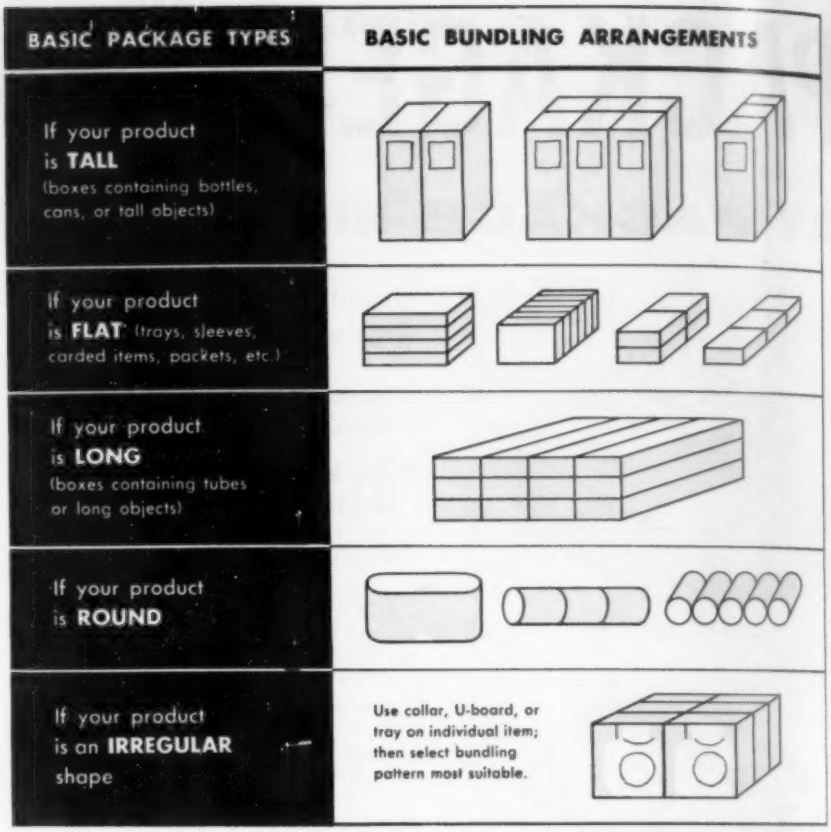








ILLUSTRATION COURTESY OLIN



which may be applied to a single wrapper have resulted in greatly increased use of printed material for wraps. The use of printed wrappers has become so common that their application by machine is routine.

There are three basic ways to apply printed wrappers to packages:

The wrapper may be printed and cut to size by the converter and used in pre-cut form in the wrapping machine. A stack of wrappers is placed in a magazine and automatically fed individually into the machine in proper synchronization with the packages. This method is suitable only for paper wrappers and some laminations.

The wrapper may be used in roll form and printed with a repeat or continuous design. Registration of such a wrapper on the package is unnecessary. The pattern is designed in relation to the size and shape of the package so that random positioning of the printed design will produce attractive results. The machine severs the wrapper from the web and applies it in the same manner as it does unprinted wrappers.

When printed material in roll form is to be used and the design is of such a nature that each printed panel of the wrapper must be positioned accurately over the corresponding package panel, the wrapping machine must be equipped with a registration device. Registration of the wrapper generally is accomplished in one of two ways—mechanically or mechanically and electronically.

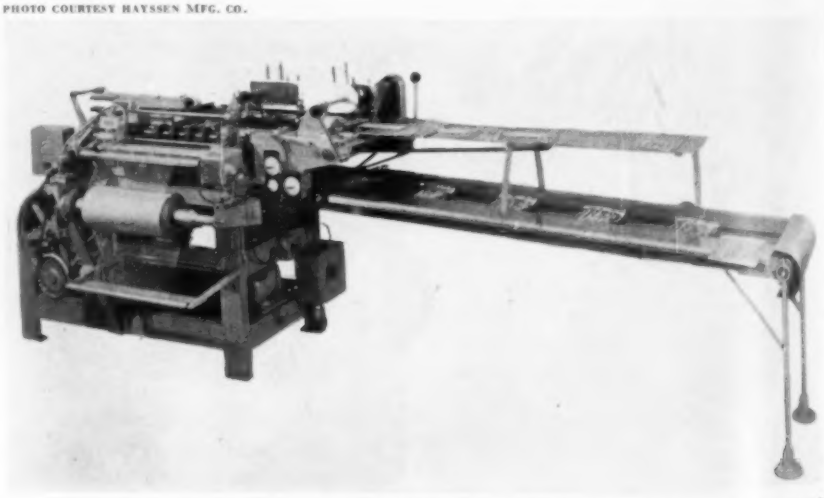
Mechanical registration requires the use of roll material on which the individual wrapper limits are marked by accurately spaced notches or holes. The material is fed in the proper amount prior to cutoff by means of a roll or drum, the periphery of which is studded with accurately spaced pins. The pins fit into the notches or holes as the wrapper is unwound and, because slippage is eliminated in this way, accurate cutoff of the wrapper is assured. This type of registration is used very little today, even in England where it once was common, except on specially designed soap-wrapping equipment and for registration of the roll-fed, thermoplastic-coated labels and end seals on bread wraps.

Registration of printed wrappers by a combination of mechanical and electronic mechanisms is by far the preferred method, because it corrects for the minute feed slippage which occurs in all machines and for minor dimensional printing inaccuracies. As the wrapper unwinds from the roll, its position in relation to the wrapping cycle is "scanned" by means of a beam of light which checks design position, or by a mechanical feeler which detects differences in thickness between printed and unprinted portions of the web. If the wrapper is in register, no correction is necessary, but if the wrapper is slightly out of position, the scanning device sends a signal to an amplifier unit, which in turn actuates a mechanical unit that advances or retards the wrapper into proper position before it is cut off.

Supplementary feeds

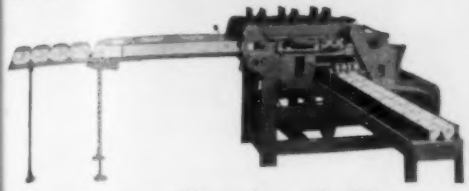
Many packages involve the use of more than a single wrapper for utility and appearance. Most standard supplements to a package can be handled automatically by the wrapping equipment. Coupons, booklets and

PHOTO COURTESY HAYSSEN MFG. CO.

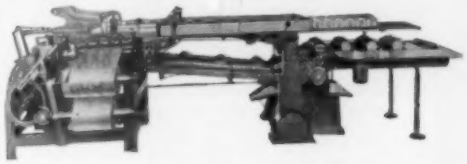


Bacon is wrapped interchangeably with Pliofilm or cellophane at speed of 50 packs a minute on this machine with close registration of printing.

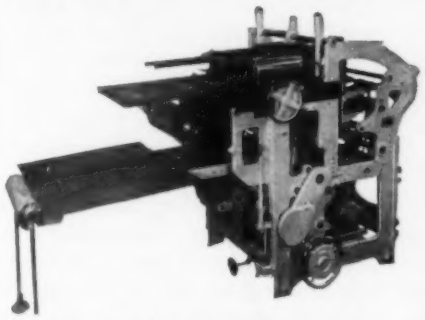
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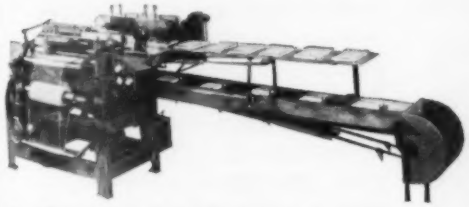
Paper Products Wrapping Machines—
Wrap Ream Paper, Memo Pads, Tablets, Envelopes, Loose Leaf Fillers, Office Stationery, Sales Books, Magazines, Gift Wraps, Greeting Cards, Napkins, Toilet Tissue, Towels.



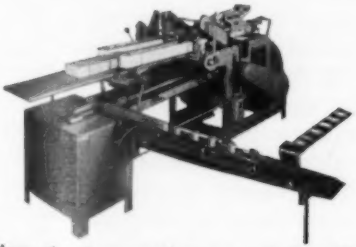
Combination Bread Slicer and Wrapper—
Wraps all types and shapes of bread including Rye and Vienna. Also wraps sweet goods, cakes, pies, rolls, pastry.



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One hand-wheel adjustment; wraps all food trays in either cellophane or Pliofilm. Hayssen Bacon Wrapper also handles cellophane or Pliofilm.



New Textiles and Knit Goods Wrapper—
Bolts of Cloth, Blankets, Sheets, Pillow Cases, Full Fashioned Hosiery, Socks, Underwear.



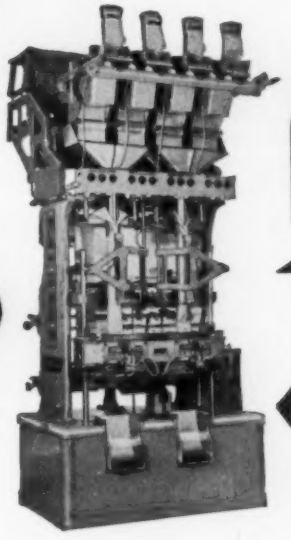
Automatic Accumulator and Bundler—
Gathers from a single line feed, any number of individual rectangular, tapered or cylindrical packages into a compact arrangement and neatly overwraps them with paper, film or foil, into one tight economical bundle.

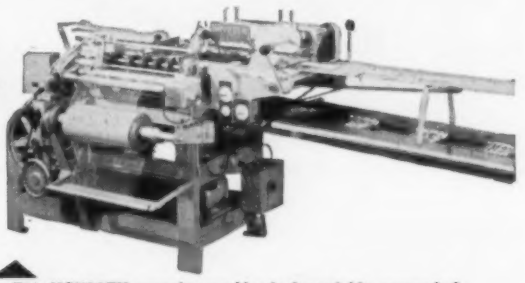


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This HAYSSEN wrapping machine is dependable, economical
Any shape, any size, neatly, tightly, easily wrapped. So simple to adjust, the operator does it—no expensive mechanics needed.

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One machine forms, fills and seals . . . any product: Solid, liquid, semi-liquid or powder. Heavy-duty Scale Feed, improved Volumetric, Auger or Pump Feeds.

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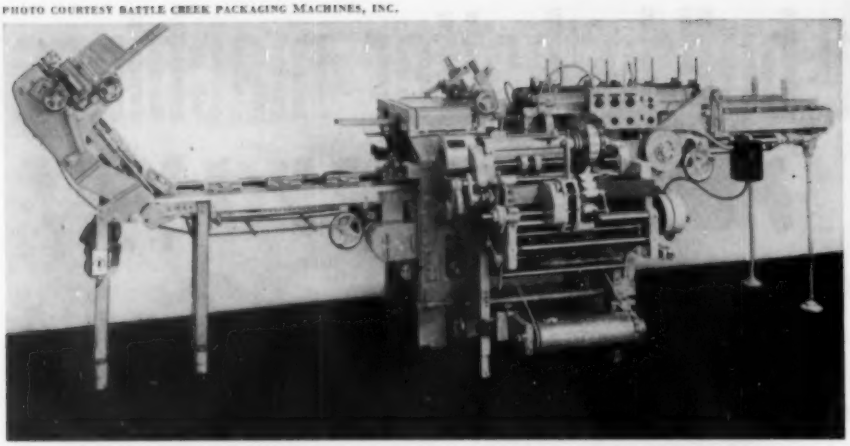
Hayssen MFG. COMPANY

Since 1910, Manufacturers exclusively of automatic wrapping and packaging machines.

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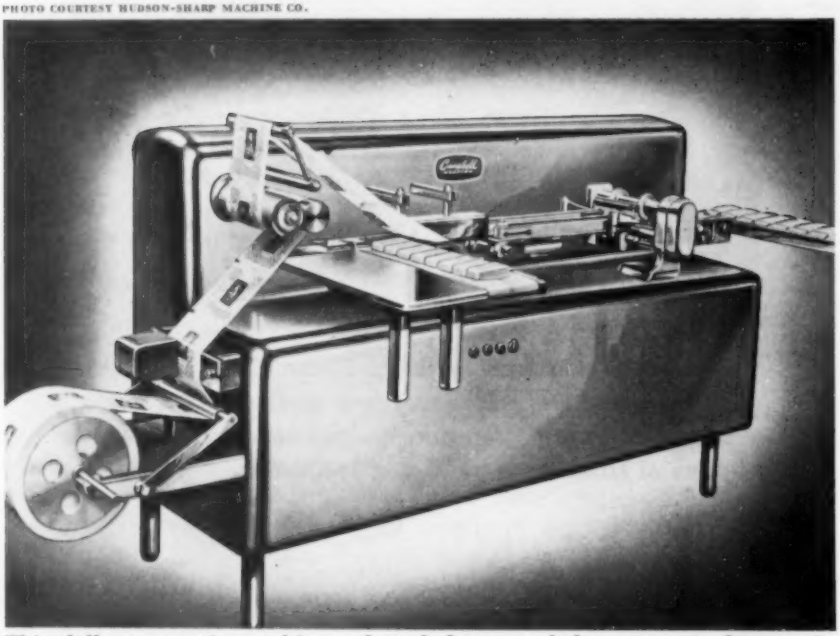
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PHOTO COURTESY BATTLE CREEK PACKAGING MACHINES, INC.



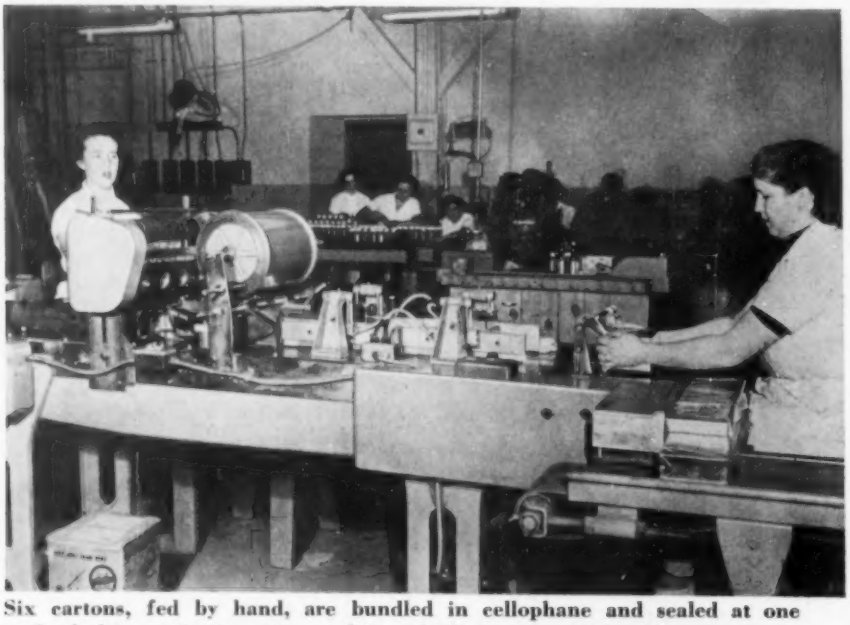
Wrapping of a continuous flow of large rectangular or round baked items is possible at speeds in the 50-to-70-per-minute range with this unit.

PHOTO COURTESY HUDSON-SHARP MACHINE CO.



This fully automatic machine, adapted from candy-bar wrapper, heat seals a tube of printed cellophane around ice-cream bar on a stick.

PHOTO COURTESY AVISCO AND SCANDIA MFG. CO.



Six cartons, fed by hand, are bundled in cellophane and sealed at one end of this semi-automatic machine which handles 24 bundles a minute.

similar items are inserted under the wrapper by the machine. Labels and medallions may be applied to the inner or outer surface of the wrapper. Some are used in die-cut form and are fed from magazines. Others are severed from a roll by the wrapping machine. Units are also available, as mentioned, to apply or create package-opening means. Flat cards or U boards of the type commonly used with single- or multiple-piece candy-bar packages may be fed automatically from a magazine or formed on the machine from roll stock.

Package feeds

Installation of an automatic wrapping machine is justified only when it enables its user to produce a salable package more economically than he could without it.

Many products like textiles, irregular baked goods which are to be wrapped individually and certain multiple candy units which must be positioned carefully before wrapping often require hand feeding into the wrapping machine.

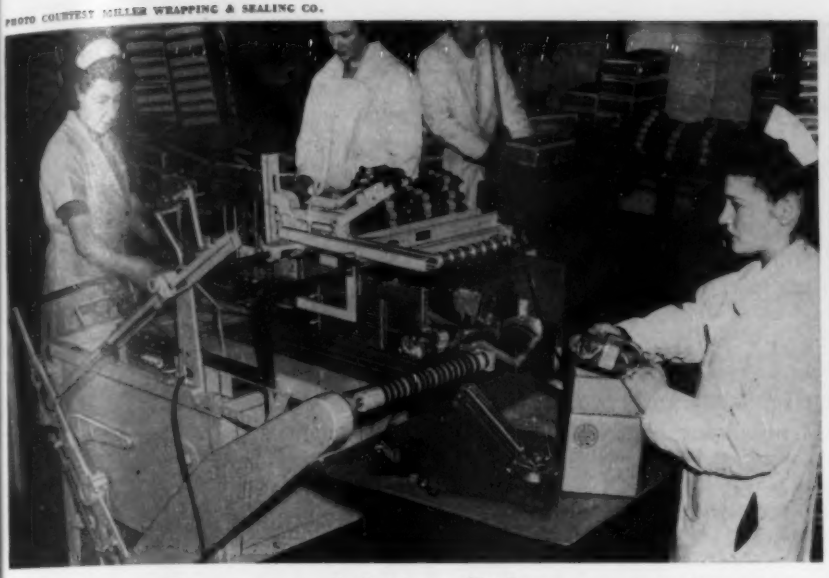
Small, hard-candy pieces which are to be wrapped individually or as assembled rolls usually are fed automatically from hoppers or special feed tables that are integral with the machines and into which the candies are dumped in random fashion. The high speeds at which they are wrapped make it impossible for an operator to feed each piece singly.

Uniform rectangular packages, such as cartons of cough drops, razor-blade cartons and cigarette packages, may be fed into the wrapping machine by conveyor—from the preceding operation or from a vertical magazine into which they are placed by an operator. In either case, indexing of the packages is automatic.

Rectangular packages whose weight and resilience preclude vertical stacking can be placed on a lug-type or flat-belt infeed conveyor by an operator; they may be conveyed into the machine automatically from the preceding operation; or they may be conveyed to a chute or other intermediate device which positions them on the wrapping-machine infeed conveyor. Loaves of bread and packages of frozen foods are typical of items fed to the wrapping operation automatically at medium to high speeds.

Round cookies and square or rectangular crackers may be fed automatically by count or by linear meas-

PHOTO COURTESY MILLER WRAPPING & SEALING CO.



This machine applies wrappers of glassine, cellophane, etc., to cartons or irregular-shaped trays at speeds ranging as high as 1,260 units per hour.

ure from magazines and some progress has been made toward feeding such items automatically from band ovens to wrapping machines.

Speed versus flexibility

It has been almost axiomatic in the wrapping-machine industry that extreme flexibility and high speed cannot be built into the same machine.

A machine which is to accommodate a wide range of package sizes obviously must be large enough throughout to wrap the largest-size package and still provide the mechanism that will enable an operator to change quickly to any other size within the machine's range. When any package other than the largest possible size is being wrapped, excessive amounts of machinery must be started and stopped and lower maximum speed limits are imposed.

Conversely, when a machine is designed specifically to handle one item or a very narrow range of sizes, size and weight of parts may be kept at a minimum, unnecessary motions can be eliminated, and very high speeds are possible. Recently designed machines for the frozen-foods industry have made possible wrapping speeds of 180 packages a minute. Cigarette packages are wrapped at 250 a minute. Small, hard-candy pieces achieve an even higher rate and chewing-gum sticks are wrapped at 1,200 a minute.

Bundling

A bundle comprises a unitized group of individual packages which have been packaged by a wrapping machine for protection and for ease in handling during shipment and storage. Machines which form such bundles are referred to as bundlers and may consist either of equipment specifically designed for bundling work or of converted wrapping machines.

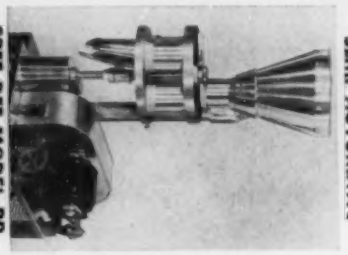
Machines are available which do all or only part of the work involved in forming a bundle. In some instances, the individual packages are assembled manually and placed as a unit into the infeed of the machine. The machine then cuts, applies and seals the wrapper, discharging a complete bundle. In other cases, the individual packages are conveyed automatically from the wrapping or cartoning machine to the bundler, which assembles them into a unit of predetermined count and pattern before bundling them.

A bundle may be wrapped in film, paper, paperboard, corrugated paper or double-face corrugated board. The bundling machine may use printed or unprinted wrapping material, may seal with glue or heat, may apply separate end seals from rolls or magazines for identification or appearance, may print the wrapper with an integrally mounted printing unit and may apply an easy-opening device.

New developments

More than 25 years ago the wrapping-machine industry gained great impetus from the development of cellophane. More recently, similar impetus has been given by the introduction of plastic films—Pliofilm, the vinyls, polyethylene and saran—as well as materials whose properties result

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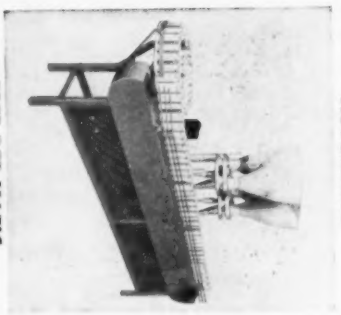
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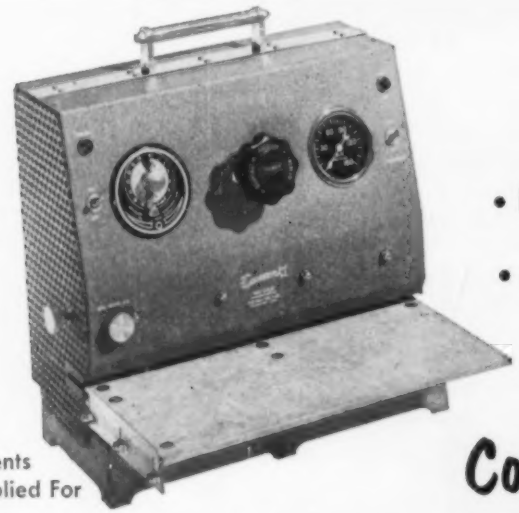
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Patents Applied For

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from laminating and coating processes.[1] Because of the availability of these materials, many more products may now be wrapped in attractive, protective, flexible materials at costs reduced by mechanization and an economical package form.

The development of new wrapping materials has necessitated the use of new types of heaters on wrapping machines. Conventional stationary heaters, even when specially coated to reduce their affinity for the materials being sealed, are no longer universally applicable. Reciprocating heaters, rotary, belt, band and impulse sealers, electronic heaters and special cooling equipment to set the seal have solved many of the problems involved in sealing the new films, but experimentation will continue until all the problems relating not only to sealing but to printing and feeding without distortion of the film have been solved.

Our mass-production economy and the increased volume of sales resulting from self-service merchandising have placed a premium on higher speeds in all phases of production, and wrapping machinery is no exception. At the same time, there is a need for flexibility which will enable the manufacturer to make minor or major changes in his packages rapidly to meet changing retail situations. As a result, new wrapping machines now under development are being designed to attain both high speeds and flexibility through the adoption of new wrapping principles.

The much wider use of bundling machines, too, is evident. Distribution of any product is expensive. The usual shipping container must protect its contents during storage and shipment but is of no value to the individual package at point of sale. The least-expensive container that will do the required job is the proper choice. A bundling machine that will form its own container from a wide range of materials in roll or flat-sheet form is not a luxury but a necessity. Experiments conducted with various foods are forerunners of a logical trend.

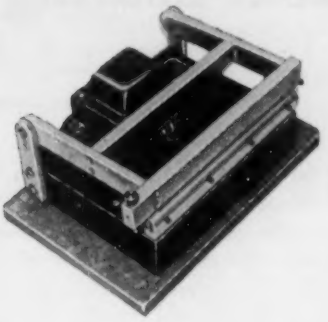
Machine selection. Generally a standard machine will exactly fill your needs, or standard models can be modified to meet the problem. Rarely is a special machine necessary but, if so, machine cost often can be greatly reduced if the machine is designed to serve an entire industry.

[1] See "Bundlers Turn to Film," MODERN PACKAGING, July, 1955, p. 75.

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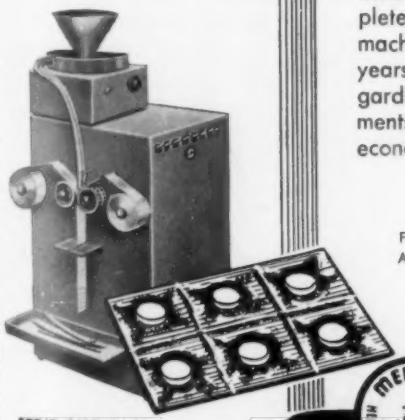
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Heat-sealing equipment

by HOWARD ROHDIN* and GEORGE CHISHOLM†

Sealing by means of heat is a fast, efficient, economical and, in some cases, the essential method of sealing together two contacting faces of thermoplastic materials. To understand the type of equipment needed for heat sealing, an understanding of the materials themselves will be helpful.

There are four basic types of flexible, heat-seal packaging materials:

1. *Homogeneous unsupported films* where the composition of the sheet is the same throughout, such as saran, vinyl, polyethylene, Pliofilm, nylon, and polyester (Mylar).

2. *Coated materials*, such as heat-sealing cellophane (cellophane coated with a thermoplastic lacquer on one or both sides of the sheet) and paper coated with polyethylene.

3. *Laminated structures*, such as films laminated by means of adhesive to foil, paper, cloth and combinations of other plastics.

4. *Combinations of coated and laminated materials*. As an example, foil coated with polyethylene on one side, the other side laminated to paper.

* Vice President Packaging Industries, Montclair, N. J.
† Sales Manager, Packaging Industries, Montclair, N. J.

When any two compatible thermoplastic materials are placed in face-to-face contact and subjected to a proper heat-sealing cycle, a fusion takes place similar to a weld. This word "weld" should be constantly borne in mind, as this process is not a "sticking" of the surfaces together, but an intermingling of the molecules into one mass. Heat sealing is generally used where there are exacting sealing requirements, thus care must be taken that nothing in the heat-sealing stages becomes the "weak link" in the "chain" of packaging operations. Of course, in some particular instances—the heat-sealed bread wrapper is a good example—a peelable seal may be imperative.

The basic heat-sealing methods commercially available today are:

1. *Roller type* (a) rotary (See Fig. 1) and (b) with pre-heater and cooling belt (Fig. 2).

2. *Band type*, band-rotary (Fig. 3).

3. *Jaw type*, bar (Figs. 4 and 5).

4. *Electronic or high-frequency* (a) bar type and (b) roller type.[1]

5. *Impulse type* (Fig. 6).

[1] This type of sealer is not illustrated, inasmuch as its construction does not lend itself to a simplified schematic drawing.

Although there is some overlapping in the uses of the various types of sealers, for all practical purposes, each has its own advantages. At this time there is no one piece of heat-sealing equipment which will satisfactorily meet requirements of every material.

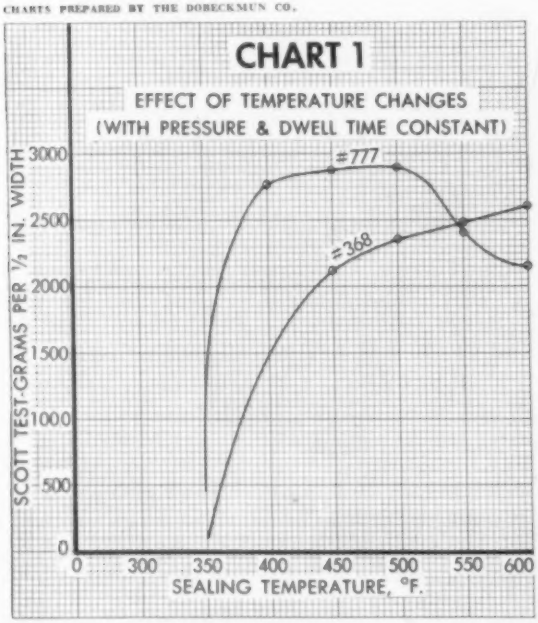
There are four basic factors to the heat-sealing cycle, all of which play a part in accomplishing results. Each method of heat sealing has its own way of arriving at these results. In some methods, the cooling phase takes place after the material has left the sealing equipment. Temperature, pressure and dwell time are important in all forms of heat sealing.

The four basic parts of the heat-sealing cycle are: (a) *temperature*; (b) *pressure*, of the heated surfaces to the material to be sealed; (c) *dwell time*, length of time of application of heat or pressure or both, and (d) *cooling time*, length of time required to "set" the heat-sealed area.

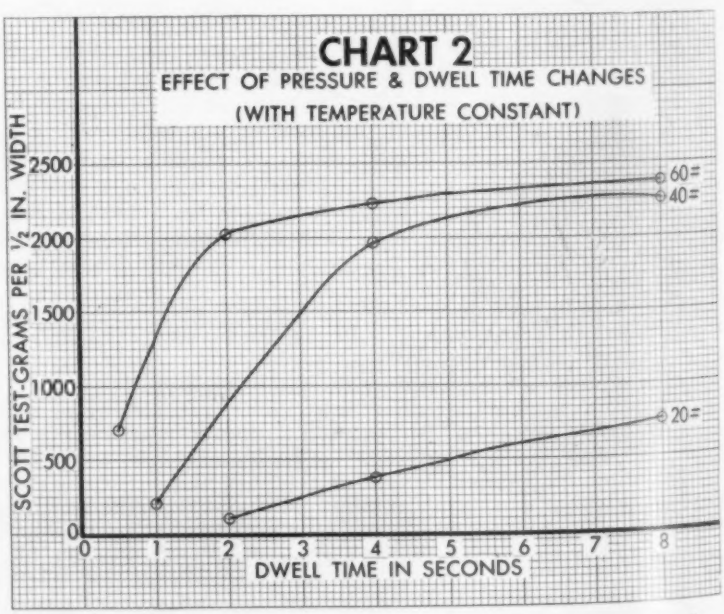
Hazards arise when the importance of any one factor is overlooked. For this reason it is required that all manufacturers of scrim-backed barrier material under Spec. Mil.-B-131-B include

(*This article continued on page 466*)

CHARTS PREPARED BY THE DOBECKMUN CO.



Importance of sufficient heat is shown. Test made with different scrim-back Mil-B-131-B materials. Constant 40-psi pressure, 2-sec. dwell.



This chart shows the importance of pressure in the sealing cycle where temperature was constant at 400 deg. F. The three lines plotted show the relative strength of seals made at 20-, 40- and 60-psi jaw pressure.

BASIC TYPES OF HEAT-SEALING EQUIPMENT

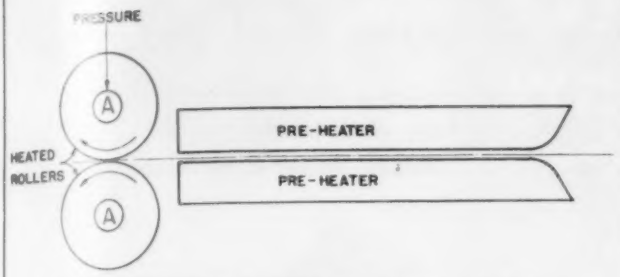


FIG. 1—ROTARY SEALER WITH FIXED PRE-HEATER followed by contacting rollers, sometimes powered to draw material past pre-heaters. If rollers are hand fed, material is pulled through the pre-heaters and rollers. Pre-heaters soften material or coatings; then rollers apply bond pressure. This type of heat sealer is frequently used for cellophane and the surface of the rollers is sometimes crimped. Special models have been developed for sealing some coated or laminated materials.

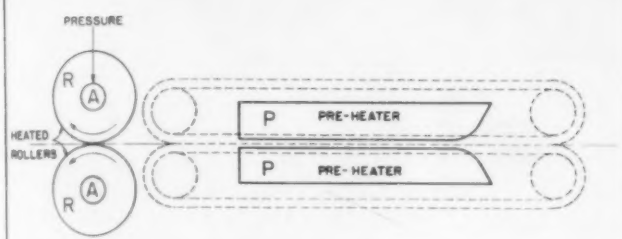


FIG. 2—ROTARY SEALER, BELT INTAKE. Endless belts (usually rubber, fibre or chain) grasp material to carry it through pre-heaters to pressure rollers, which are sometimes heated. Sometimes a second set of belts carries the material past cooling area to permit "set." Purpose of the belts is to transport material through sealers at uniform rate. Used for cellophane and some coated or laminated materials. Special models have been developed for sealing of unsupported films.

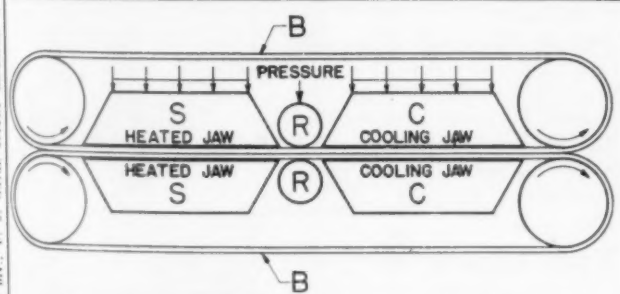


FIG. 3—BAND ROTARY SEALER. Endless metal bands (B) carry material between heating jaws, pressure rollers (R) and cooling jaws. Bands are thin: transmit heat quickly; hold material under uninterrupted contact while transmitting heat to seal material and cooling to "set" seal. Models with rollers to apply pressure between heating and cooling operations used for heavier work, including barrier materials. Used for unsupported thermoplastic films, coated and laminated barrier materials.

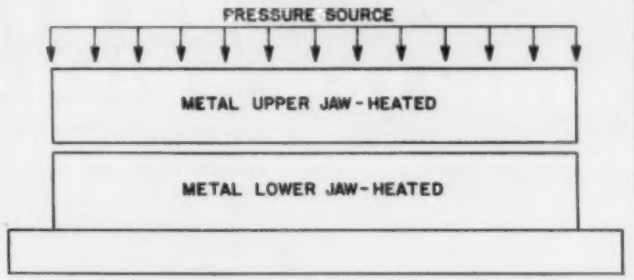


FIG. 4—JAW TYPE (BOTH JAWS METAL). The materials to be sealed are pressed between two jaws. The jaws are heated usually by a heating cartridge. The heat is thermostat controlled. Pressure control is manual or mechanical and dwell-time control is manual or automatic. The jaw-type heat sealer can be used for cellophane (with the surface of the jaws usually crimped.) Special models have been developed for thermoplastic films. The jaw-type heat sealer can be very fast—especially with longer jaws.

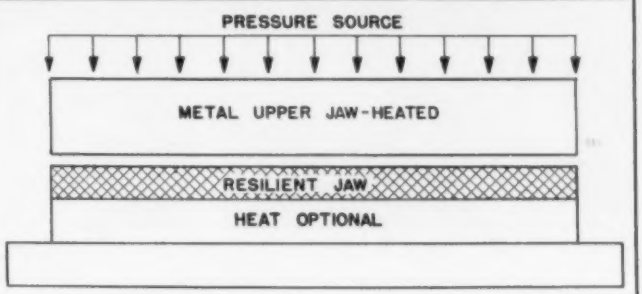


FIG. 5—JAW TYPE (ONE METAL JAW AND ONE RESILIENT). Materials are pressed together between two jaws. One or both jaws may be heated, usually by a heating cartridge. Heat, thermostat controlled; pressure control is manual or mechanical; dwell-time control is manual or automatic. Used for coated and laminated materials. Resilient lower jaw permits sealing over wrinkles, splices, etc. Models of this type of sealer with special controls have been developed for heavy work, barrier materials.

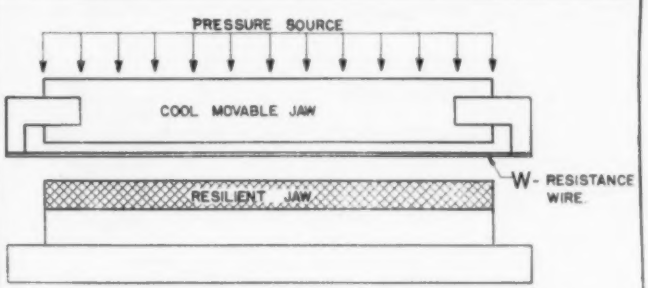


FIG. 6—IMPULSE-TYPE SEALER. This is a jaw-type sealer, but jaws are cold rather than heated. Heat is supplied by a resistance wire that gets a quick shot or impulse of current. After impulse, material is allowed to cool, still held under pressure between the jaws. Impulse-type sealer is generally used for sealing of unsupported thermoplastic films, but can also be used for sealing some coated and laminated materials. Models with control over cooling period prevent film distortion.

PACKAGING DESIGNED UNDER SUPERVISION OF U. S. NAVAL SUPPLY RESEARCH & DEVELOPMENT FACILITY

"SPEEDY BAG PACKAGER"...*

makes polyethylene bag packaging quick and simple.

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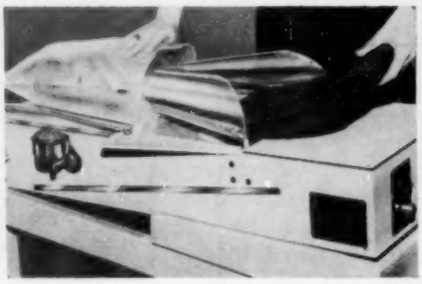
The "Speedy Bag Packager" generates a controlled stream of air that blows open the bag. The Article to be packaged slips on smooth surfaces between two polished, adjustable metal guides, thus insuring no damage to the merchandise or the bag, but PLENTY OF SPEED. The "Speedy Bag Packager" pays for itself in thirty to ninety days in labor savings.

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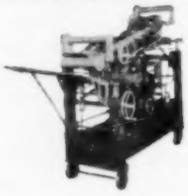




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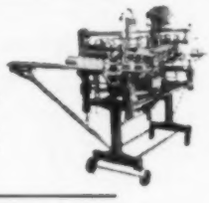
Better Labeling and Casing BY NEW WAY

Series E Labelers



For glass and other cylindrical containers. Adjustable for all sizes from 112 to 403 dia. by 112 to 710 high and from 200 to 611 dia. by 200 to 708 high. Has sight-feed paste pot and hi-temp glue pot. Continuous label feed optional.

Series V Labelers



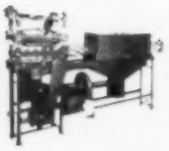
A lower priced labeling Machine for moderate speed operations. Has all the versatility of Model E and is adjustable to a wide range. Can be supplied for regular wrap-around or spot labels.

Container Feed Tables



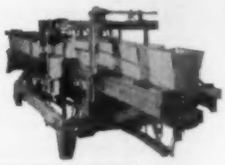
Eliminate excessive labor costs by automatically accumulating and placing containers in a single or double line.

Jar Cleaning Lines



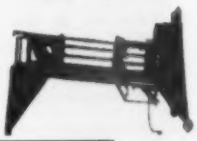
To handle wide-mouth jars or cans, blowing out dust and loose matter by air, or to sterilize with steam. Can be had with water jets for rinsing.

Gluing - Sealing



The newest ideas in economical gluing and sealing with enclosed glue lines that do not need constant cleaning.

Gravity Type Caser



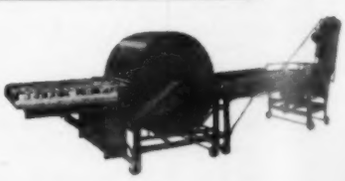
An inexpensive but highly efficient roll-in type gravity Caser with right-hand, left-hand or two side delivery.

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High speed models being constantly improved. Single tier or two tier cases filled with one push, at speeds up to 24 cases per minute with double discharge.

Tray Invertors



To dump horizontal retort crates and line up the containers in a single or double line for the next operation.

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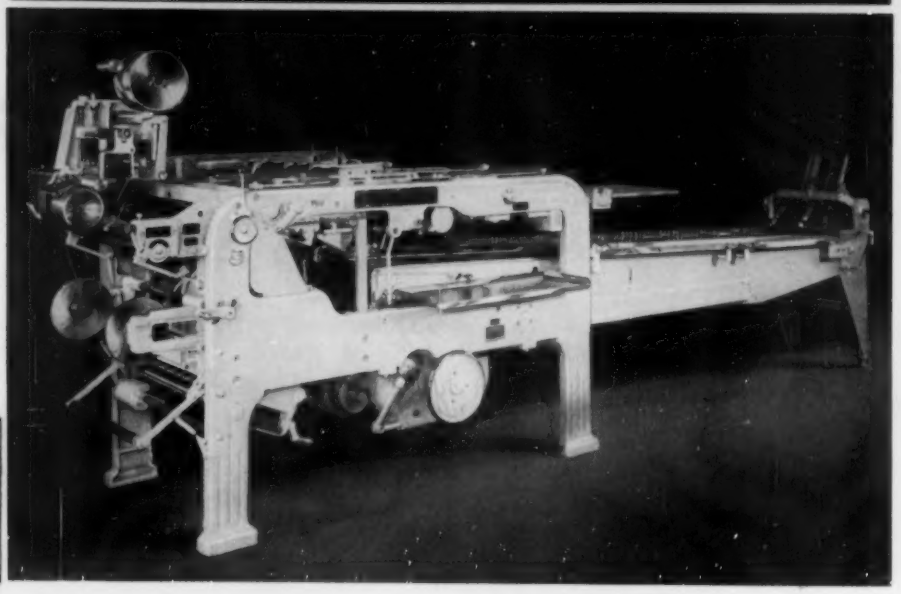
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ere's another case where a simple package design mag-ies the beauty of the product. Handling cannot soil otected skeins of yarn. The unit cost for packaging is all. Let our engineers help you package your oduct to cut costs and increase sales. Write us today.

You'll find this machine in the packaging departments of industrial leaders. It wraps and labels baked goods, fresh produce, dried fruits, frozen foods, boxed candies, paper specialties, textiles, etc. in almost any heat-seal material. It uses cartons, trays, U-boards, cards—or without supports.

The Oliver can also handle kraft paper overwraps; it glue-seals envelope-style endfolds and bottom seal for bundling. And a special Oliver wraps sausage and bacon.

Each of eight Oliver models wraps packages in a wide range of sizes. Has infeed conveyors 6 to 15 feet long. Handles up to 50 packages a minute. Automatic cardboard folder-feeder is foolproof. Codes cartons, cards, labels. The Roll-Type Labeler is indispensable.

You can place the Oliver in a conveyorized line with automatic package transfer and loader onto the infeed conveyor.

The Oliver is unmatched for quick adjustability and versatility! Make a complete change for package size in a minute or two. Wrapper length is adjustable while machine is running. Switch from endfold to underfold at the flick of a finger. Change rolls of labels in a jiffy. Printed wrappers are registered by electric eye. The efficient Oliver can save you money too. *Write for complete details today.*





OLIVER LABELER . . . *attach it to your present machine*

The Roll-Type Labeler is an independent unit. It can be mounted on Olivers now in use or on other makes: Package Machinery, Hayssen, Battle Creek, some Nationals, AMF and Campbell (Hudson-Sharp) machines. A diecut label from a continuous roll (printed by Oliver) is heat-sealed to wrapper by labeler. A partly pre-printed label can be imprinted with essential data just before it is heat-sealed to the wrapping material. Imprint items can be changed in a few seconds. Available with or without Imprinter. *Investigate!*



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HIGH GRADE MACHINERY

OLIVER MACHINERY COMPANY GRAND RAPIDS, MICHIGAN, U.S.A.

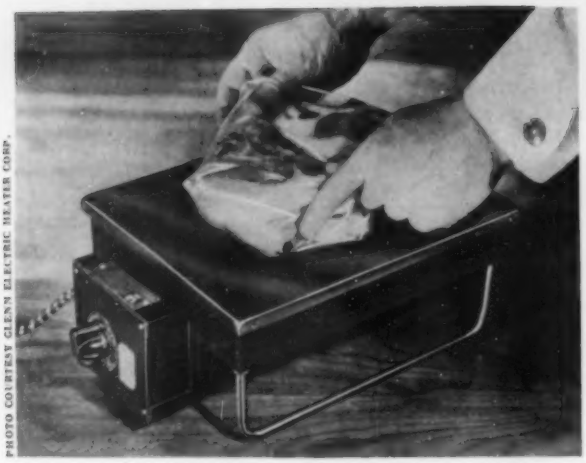


PHOTO COURTESY GLENN ELECTRIC HEATER CORP.

A constant-temperature hot-plate film sealer is available in various finishes: grooved or ridged and steel or aluminum.



Jaw-type bag sealer automatically labels and seals all heat-sealable bag materials. Attachments for hole punching, coding and imprinting.

the recommended temperature, pressure and dwell time in every roll of material.

In the sealing of unsupported films, excessive temperature or pressure may cause a thinning out of the heat-sealed area, with a consequent weakening of the seal. This is usually accompanied by "ears" which extend from the edge of the seal. It should be noted, however, that, when seals on films of this kind are to be made through various wrinkles and thicknesses (such as gussets) or contamination, sometimes small "ears" are inevitable and do not materially affect the efficiency of the package.

Briefly, each basic type of heat-sealing equipment controls these four factors of the heat-sealing cycle:

Rotary with fixed pre-heater

1. Temperature: Usually controlled by rheostat or thermostat.

2. Pressure: Usually by exerting pressure on shafts (A in Fig. 1).

3. Dwell time: Very brief. Depends on speed of material through rollers.

4. Cooling time: Usually no control for cooling on this type.

Rotary with belt intake

1. Temperature: Either by material actually contacting pre-heaters (P in Fig. 2), or by radiation from pre-heaters. Rollers (Fig. 2) may also be heated. Both pre-heaters and rollers are generally individually thermostatically controlled.

2. Pressure: Controlled by pressure on roller shafts (A in Fig. 2).

3. Time: Very brief, but said to be compensated for by the time the material is in the pre-heater zone.

4. Cooling: The "set" may be accomplished by auxiliary sets of compression belts which pick up the heat-sealed material after it has gone through pre-heaters and rollers.

Band type

1. Temperature: Thermostatically controlled shoes (S in Fig. 3) pass heat through moving metal belts (B).

2. Pressure: Pressure by contact of heater shoes on belt. Heavier pressures by rollers (R).

3. Dwell time: Controlled by speed of bands (B) through heater shoes (S).

4. Cooling: Controlled by speed of bands (B) between cooling shoes (C) (generally water cooled). It should be noted in this type that the material being heat sealed is held by the bands without interruption through the heating and cooling stages of the cycle.

Jaw type

1. Temperature: Usually thermostatically controlled. Two types are available; (1) two jaws heated (Fig. 4); (2) one jaw heated, and another jaw generally having a resilient facing (Fig. 5) to compensate for irregular gauges in the materials, as well as for wrinkles, splices, gussets, etc.

2. Pressure: Pressure on movable jaw accomplished by hand, foot, motor, hydraulic or pneumatic power.

3. Dwell time: Controlled by dura-

(*This article continued on page 468*)

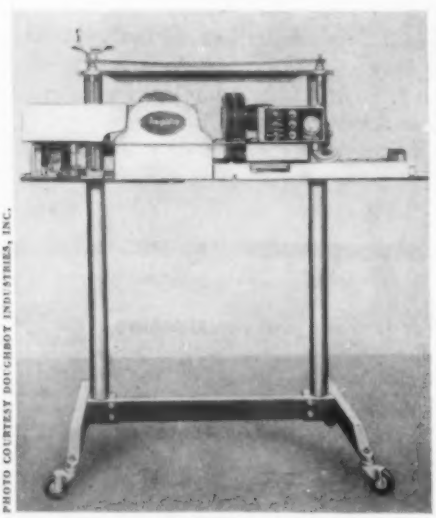
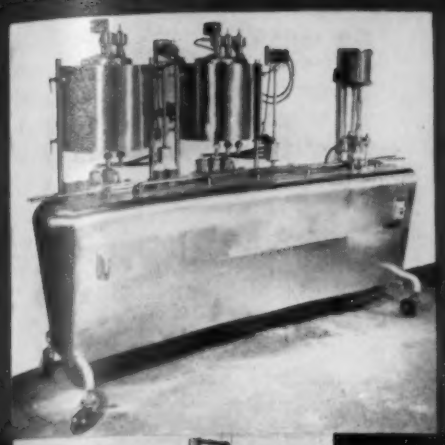


PHOTO COURTESY DOUGHBOY INDUSTRIES, INC.

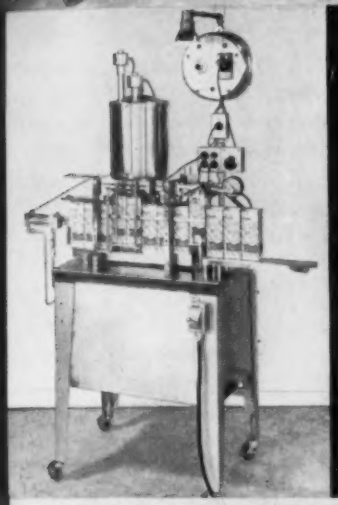
Heavy-duty band sealer designed for continuous high-speed sealing of plastic film. Can be adapted for foil, scrimback laminates or for cellophane.



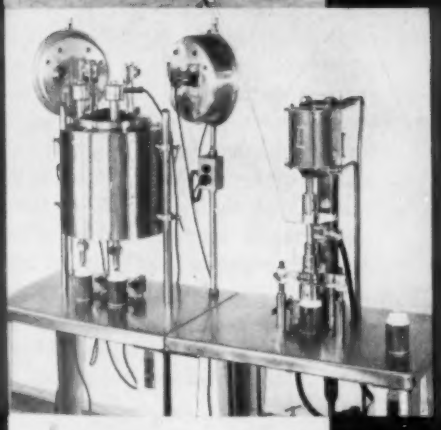
High-frequency impulse type sealer electronically seals acetate, saran and other plastics. It is successfully used for sealing of vacuum-formed packages—especially irregular or contoured shapes.



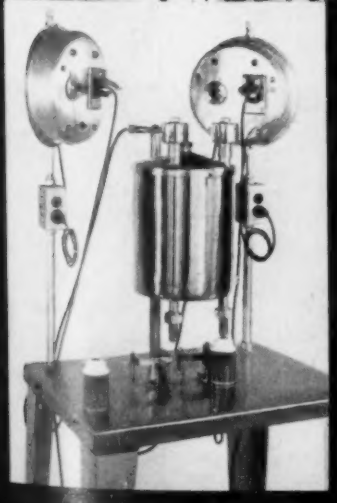
AUTOMATIC AEROSOL FILLER, MODEL MASOC—Fills by the cold fill method and crimps valves on cans. Rated speed 30 cans per min. Other models available to 90 cans per minute or better.



AUTOMATIC MILK CARTON FILLER, MODEL E Sealking—Fills and seals quart to half pint cartons at a rate of 20 qts. per min. Manual, semi-automatic and automatic fillers available for all types of milk cartons in all sizes for speeds of 4 to 30 cartons per minute.



SEMI-AUTOMATIC AEROSOL FILLER MODEL—Fills all types of aerosols and crimps valves on cans. 15 cans per min. Both cold fill and pressure fill models available. Other models available up to 45 cans per min.



SEMI-AUTOMATIC FILLER FOR CANS, GLASS, PLASTIC OR PAPER CONTAINERS—Highly versatile. Handles fills of an ounce or less to a half gallon or more. Fills any free flowing liquid. Now in wide use on many special filling problems.

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"Electromatic"® FILLERS

FOR FILLING CONSTANT VOLUMES OF FREE FLOWING LIQUIDS

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- **ELECTRONIC FILLER CONTROL** — gives highest filling accuracy
- **FILLING VOLUME INSTANTLY ADJUSTABLE** — with just a turn of a dial
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- **LOWER MAINTENANCE COSTS** — because the design is simpler and there are fewer parts
- **LESS CLEANUP OR CHANGEOVER TIME** — because the filler is the simplest ever made
- **NO SKILLED LABOR NEEDED** — simple and easy to operate

Other models available to 90 cans per min. or better.

There is a Mojonnier "Electromatic" filler for your needs. Only Mojonnier offers you the patented "Electromatic" filling principle. Write or phone us for full information.

® "Electromatic" fillers are manufactured under U. S. Patent Re. 23,830. Other patents pending. Trademark "Electromatic" registered U. S. Patent Office.

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tion of pressure, either manually or by automatic timing.

4. Cooling: Generally no controls for cooling on this type.

Electronic or high frequency (bar)

With the bar-type electronic or high-frequency sealer, material is placed between jaws or plates of sealer and high-frequency current is passed through the material between two electrodes. The jaws may be straight or they may be shaped to a given design. Heating of the plastic material takes place as current passes through and fuses layers together.

1. Temperature: Controlled by the reaction of material to current flow passing from one electrode to the other.

2. Pressure: Pressure on movable jaw accomplished by hand, foot, motor, hydraulic or pneumatic power.

3. Dwell time: Controlled by duration of pressure, either manually or by automatic timing.

4. Cooling: Controlled by length of time of uninterrupted jaw contact on material after termination of heating current.

Electronic or high frequency (roller)

In the roller-type electronic or high-frequency sealer, rollers draw the material past the electrodes in an action which is often referred to as electronic "sewing." The comparison is descriptive, except that no "needle holes" appear in the material. As current passes between electrodes, the material is fused together. This type of sealer is used for sealing certain thermoplastic materials where irregular shapes are required, such as in raincoats, bags, umbrellas and toaster covers. Both types of electronic sealers are used on certain thermoplastic materials, depending upon their dielectric properties.

1. Temperature: Controlled by the reaction of material to current flow from one electrode to the other.

2. Pressure: Usually by exerting pressure on shafts.

3. Dwell time: Very brief. Depends upon speed of material through rollers.

4. Cooling: None.

Impulse type

1. Temperature: Controlled by the amount of current passing through the resistance wire (W in Fig. 6).

2. Pressure: Pressure on movable jaw accomplished by hand, foot, motor, hydraulic or pneumatic power.

3. Dwell time: Controlled by duration of pressure, either manually or by automatic timing.

4. Cooling: Controlled by length of time of uninterrupted jaw contact on material after termination of heating current.

A heat-sealed package is, of course, no better than its poorest seal. This means that the packer who makes the final closure seal has just as much responsibility as the converter who made the package. He faces more hazards in the form of wrinkles, contamination, etc. He should know the correct sealing cycle for the material used in his package and he should have the facilities to set up that cycle.

Manufacturers of military-type barrier materials know the importance of correct heat sealing, and are constantly stressing it to converters and packagers. Laboratory tests are being made constantly to determine the importance of each phase in various methods of sealing. Charts 1 and 2 (p. 462) show the effect of changes in temperature, pressure and dwell time in the sealing of barrier materials. These tests are the basis for heat-sealing recommendations made with every roll of 131-type scrim-backed barrier material.

How to evaluate heat seals has been a constant problem and much work has been done to test various types of seals. The problem of quickly testing a seal is particularly acute on the production line.

An outline of seam-testing procedures can be found in Military Specification Mil-S-4461 (USAF), (page 10, items 4.2.3.4.2 and following, "Single seam test," "Grease contaminated seam test," "Overlaying seam test" and "Seam leak test"). This outline of procedures deals with tests the military has found necessary for evaluating critical performance of heat-sealed military barriers.

Summary

Much progress has been made in heat sealing in recent years, but many misconceptions still exist as to what constitutes good heat sealing and the means of achieving it. As more attention is paid to this phase of packaging operations, a better appreciation of its hazards will suggest greater attention to the details of heat sealing. As manufacturers of heat-sealable materials show greater appreciation of these problems, they will suggest heat-sealing cycles which will result in the best use of their product. In recent years greater attention to the inspection and testing of heat sealing in military packaging has awakened greater interest in the problems and their solutions. One real need is some simple method of evaluating a heat seal to distinguish good, bad and mediocre.

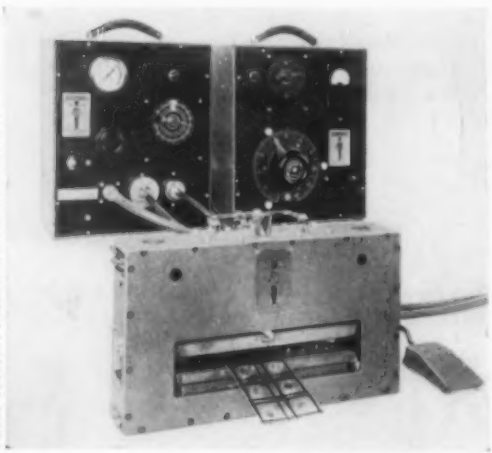
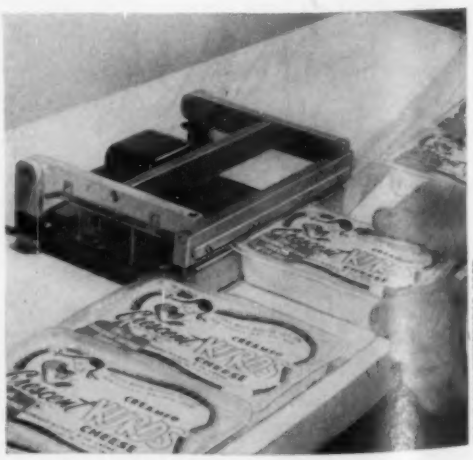


PHOTO COURTESY PACKAGING INDUSTRIES LTD., INC.

Impulse - sealing equipment shown here is sealing bearings in individual transparent compartments. Compartments are filled with oil.



A vacuum-formed polyethylene container is heat sealed on a jaw-type electronic sealer.

HEAT SEALER VENTROD CORP.

Low Packaging Costs Demand

HI-SPEED Equipment

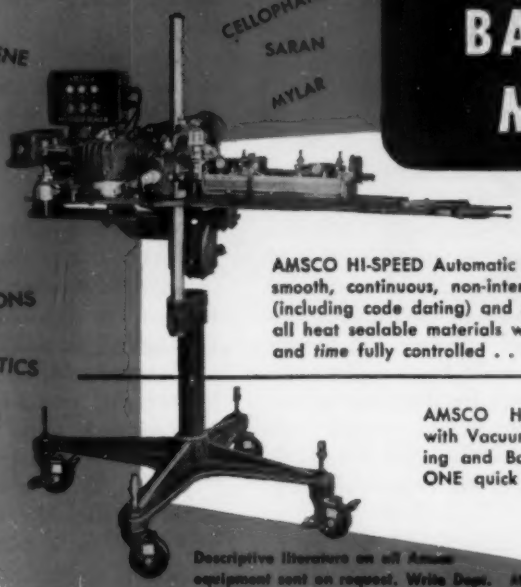
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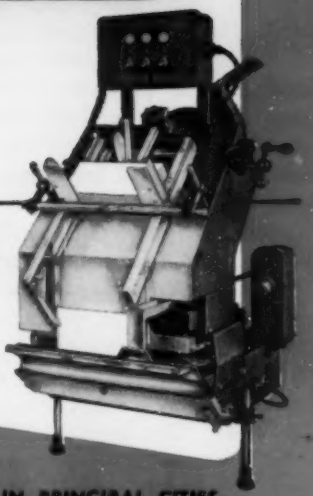
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HI-SPEED AUTOMATIC

BAG SEALING MACHINES



AMSCO HI-SPEED Automatic Rotary Sealer for smooth, continuous, non-intermittent operation (including code dating) and perfect sealing of all heat sealable materials with *heat, pressure* and *time* fully controlled . . . automatically.



AMSCO HI-SPEED Automatic Sealer with Vacuum Labeler for Header Labeling and Bag Sealing automatically in ONE quick simple operation.

Descriptive literature on all Amsco equipment sent on request. Write Dept. MP-4

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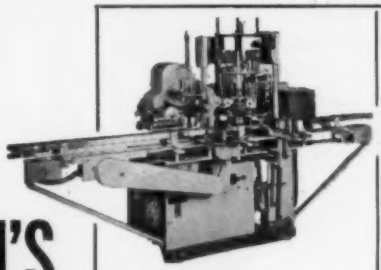
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SIMULTANEOUS FILLING & LABELING • FULL VACUUM FILLING PLUS PERFECT LABEL APPLICATION

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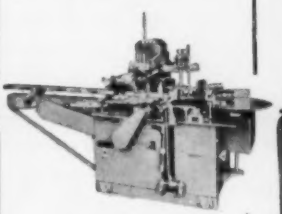
- *filling*
- *labeling*
- *unscrambling*



"FILABELMATIC"

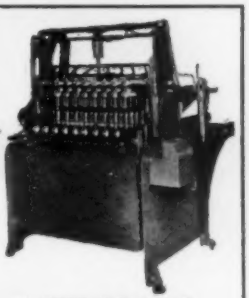
This most popular combination unit fills and labels simultaneously. Standard model fills all sizes up to quarts at 60 per minute.

Gallon model fills 25-30 gallons per minute, 45-50 halves. Will also handle smaller sizes. Efficient, dependable with foolproof performance.



"LABELMATIC"

Here's a machine that's a favorite with those who demand fast, efficient labeling. Standard "Labelmatic" labels all size containers up to quarts at 60 per minute, and labels gallons and halves at 25 per minute. Easy, fast changeovers. Duplex unit labels 100-110 per minute on up to 3" diameters.



"FEEDOMATIC UNSCRAMBLER"

—now with air cleaning!
Now positive air cleaning for each container makes the "Feedomatic" better than ever! Operates silently, does not mar or scratch the bottles. Changes over in minutes, for any size from an ounce to a gallon . . . including rounds, squares, and ovals. Discharges either right or left. Output: 30-150 per minute. Save space with this dual purpose machine.

Details supplied upon request.

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Biner-Ellison Export Division

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Pouch formers, fillers, sealers

An increasingly important type of packaging equipment is the single-unit machine that automatically forms a flexible package, fills it and closes it. Machines of this type represent an entire packaging line insofar as the primary container is concerned. They are designed, in general, for high-volume output and are widely used in packaging mass-distributed, low-cost products such as peanuts, candies, soap powder, chemicals, tea in tea bags, pills, tablets and the like.

Automatic packaging machines have been in use for many years, but in recent years new machines have been introduced and standard machines have been improved and made more versatile to meet the increasing demands of products employing flexible packages. This increasing demand has been spurred by the growth of self-service merchandising and the accompanying need for functional, visibility and convenience packages. The pouch-style container, which can be formed from a very wide range of web stocks, including coated and laminated materials, abounds in functional characteristics and lends itself, of course, to visibility and convenience packaging. Since roll stocks are used, the problems of procuring, handling and feeding pre-formed containers are eliminated and the steps of filling, in-line transfer and closing—usually handled by separate line installations—are performed on a single machine. Labeling, too, is usually taken in stride because the automatic packagers are designed to register automatically pre-printed web stocks. In some instances a random design that does not require registration is used.

Numerous attachments are available to help make the packaging operation efficient and the package more functional. Attachments can be employed to apply tear tapes during the packaging, perforate the pouch or notch one edge for easy opening.

Tea bags have a string and tag attached during forming operations. Some strips of pills or tablets packaged in imprinted transparent film are mounted in catch folders or on cards. In some instances the primary container is automatically cartoned by an attached machine.

Not only is automatic pouch packaging basically a compact and efficient operation, but as discussed elsewhere in this book (See "Envelopes and Packets," p. 245 and "Unit and Strip Packaging," p. 248) the merchandising features of these versatile, handy, lightweight, economical packages are in step with some of the "hottest" trends in packaging and marketing.

Just as there are many different styles and sizes of pouch packages, so, too, there are a number of different machines, makes and models. Shown in the accompanying illustrations are a number of the machines available and most of these are made in several models.

Automatic pouch- or packet-packaging machines share one important

Completely automatic machine has an adjustable pocket feed, volumetric cups and platen seam seal.

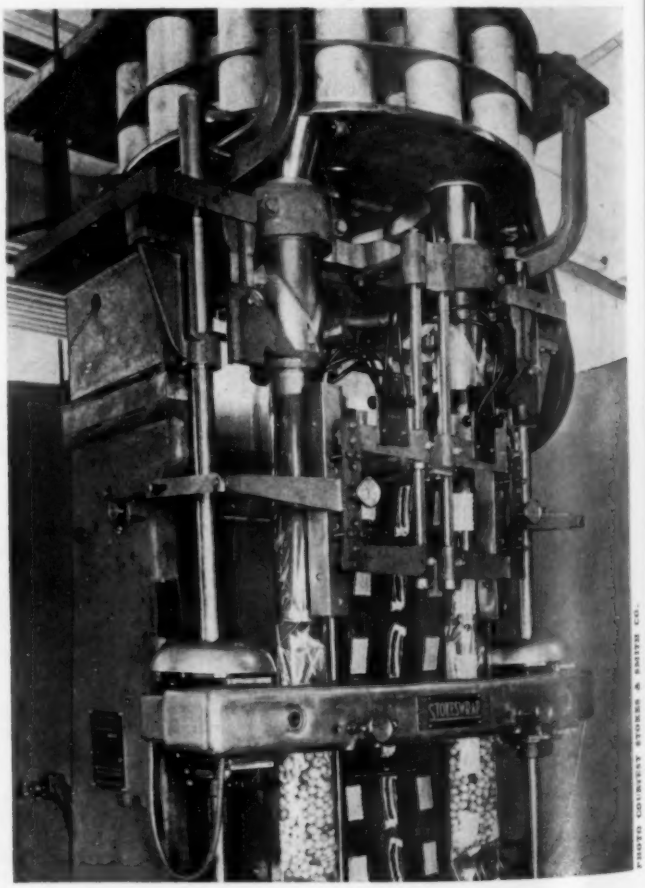


PHOTO COURTESY STOKES & SMITH CO.

Using film or laminates in roll form, machine forms, fills and closes up to 100 pouches a minute.

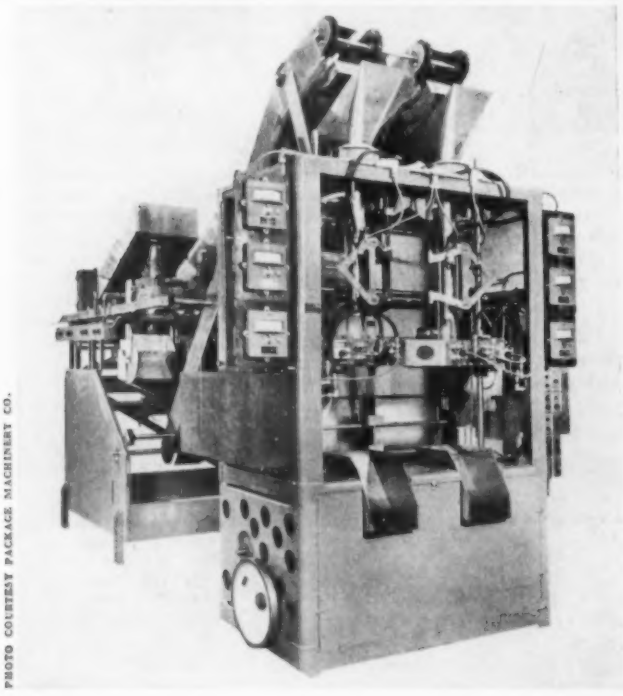
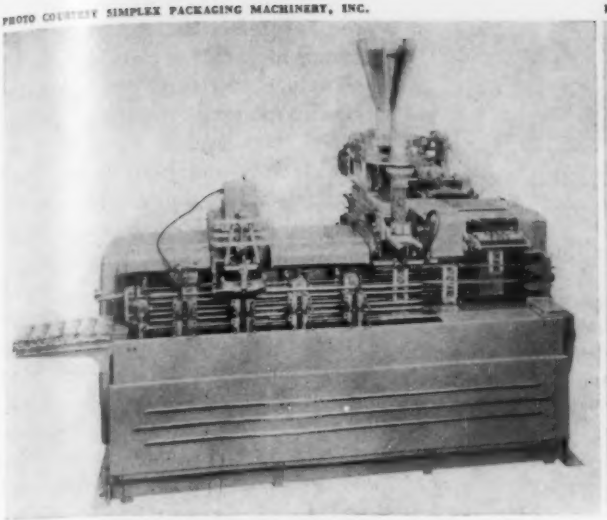


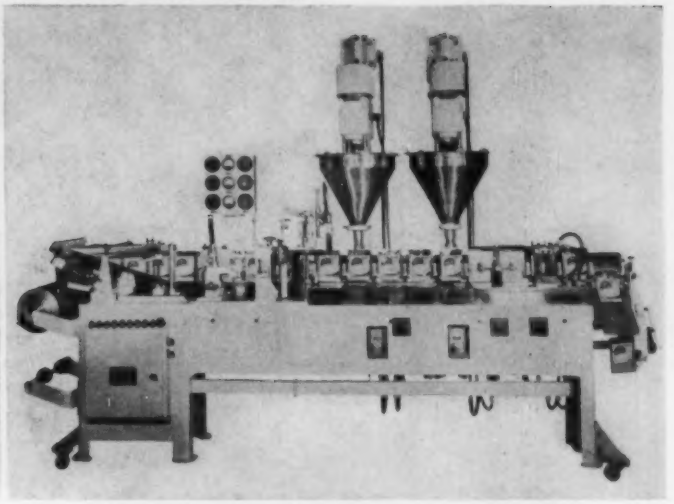
PHOTO COURTESY PACKAGE MACHINERY CO.

PHOTO COURTESY SIMPLEX PACKAGING MACHINERY, INC.



Shown with volumetric filler, machine automatically forms, weighs, fills, seals 30 to 35 bags a minute.

PHOTO COURTESY BARTELT ENGINEERING CO.



Basic high-speed machine forms bags, opens them for filling, seals them. Various-type fillers available.

characteristic—they operate with web stocks and handle a wide range of heat-sealing materials, including paper, foil, films and laminations. Some models are designed so that they can be changed over to handle a range of products or sizes, but in general this range is limited since the basic advantages of these machines are fulfilled only with long-run production.

The size of packets that can be formed ranges from a tiny individual packet, holding a single pill, up to any size pouch considered practical for this type of packaging. Pouches holding as much as 5 lb. can be made, but in general the contents weight is measured in ounces and relatively few pouches holding as much as a pound have been on the market. Obviously, there is no universal model handling all sizes. Instead there is a range of makes and models for each operation.

Pouch styles include those formed from a single web or from two webs. The single web produces a closed packet that requires a three-edge seal. For example, the well-known pillow-type pouch, made from a single web, is formed into a tube with a vertical seam up the back. The tube is then heat sealed at top and bottom, producing a package shaped like a pillow with two flattened ends. A second method folds the single web and seals the remaining three sides.

Another type of pouch made from a single web can be formed with a gussetted bottom. In one adaptation the gussetted bottom permitted the unit packet to stand on its bottom edge for table service.

Pouches formed from two webs

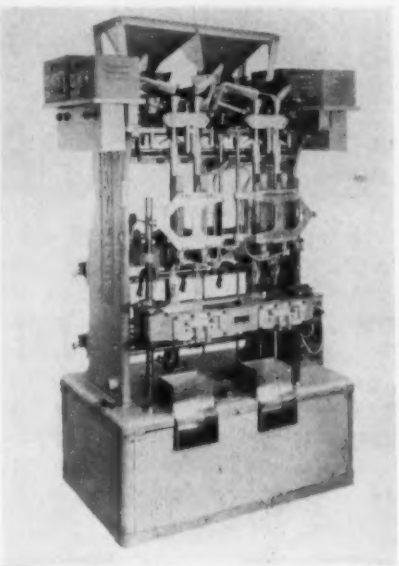
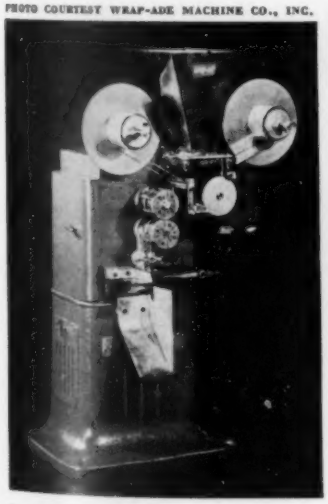


PHOTO COURTESY BATSSEN MFG. CO.

Automatic pouch former, filler and sealer handles wide range of sizes.

PHOTO COURTESY WRAP-ADE MACHINE CO., INC.



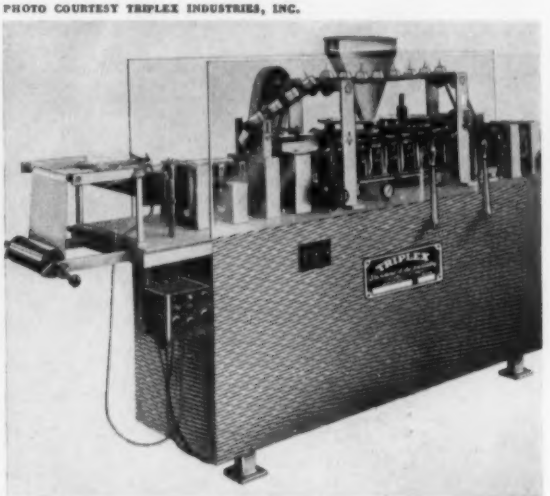
Powder packager used in chemical trade has an automatic volumetric feed.

PHOTO COURTESY PAK-RAPID, INC.



Unit forms a four-side-seal packet, 1-in. to 6-in. square. Machine is adjustable to size.

PHOTO COURTESY TRIPLEX INDUSTRIES, INC.



This compact table-height pouch machine has three-way bag-opening control; positive electronic indexing; smooth continuous operation.

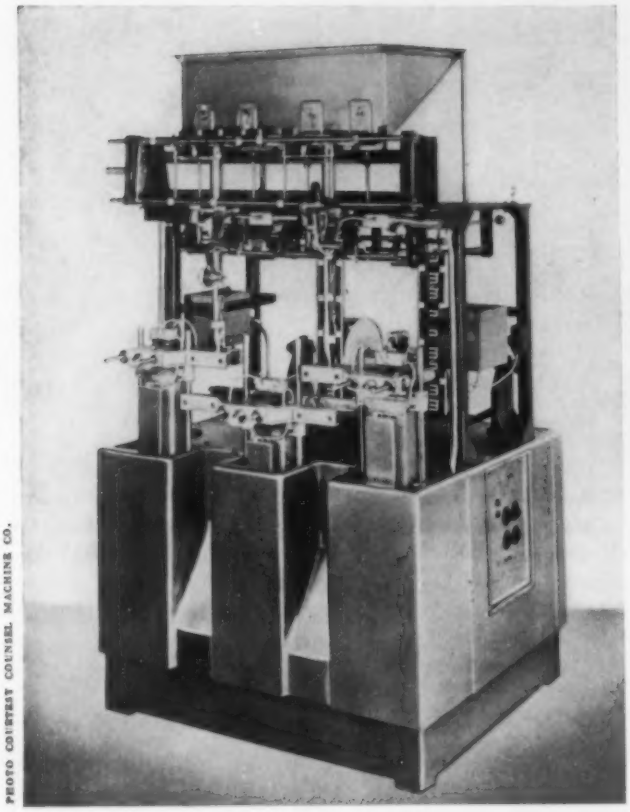


PHOTO COURTESY COLONEL MACHINE CO.

Pillow-type bags are formed, filled and sealed from a wide range of flexible packaging materials by this high-speed package maker.

have all running edges heat sealed, producing a four-seal package.

An interesting variation on the pouch package is the duplex or two-compartment pouch that packages popcorn in one compartment and vegetable oil in the other. The compartments are formed by a vertical heat seal up the middle. This type of package—with opportunities implied for numerous product duos or trios—is formed, filled and sealed on specially designed automatic packaging equipment.

Pouch packaging lends itself not only to component or combination packaging but also to multiple, fractional and strip packaging.

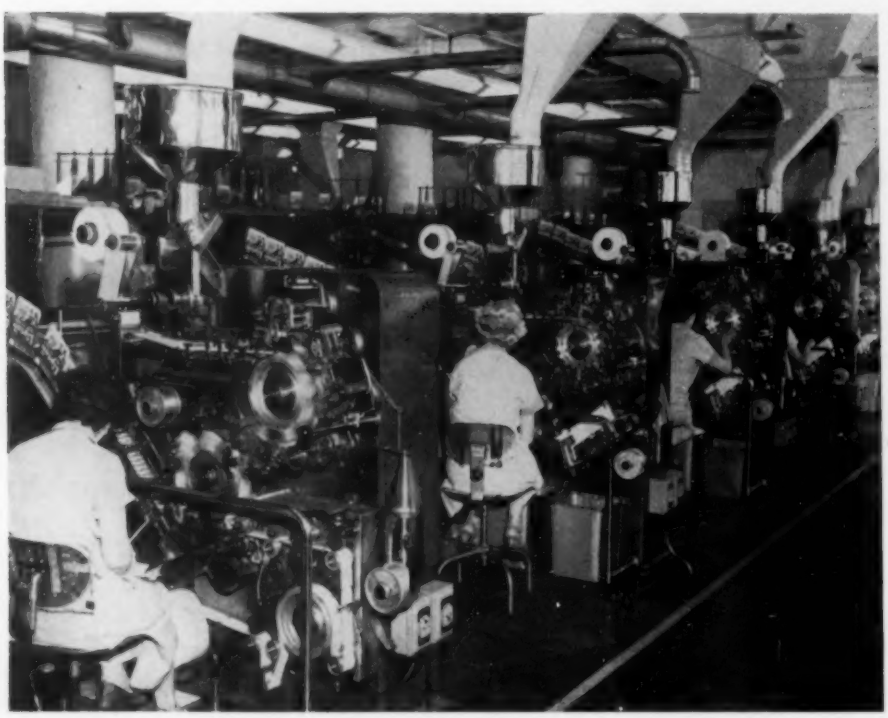
Pills and tablets, for example, make effective use of strip packages, which are produced on automatic equipment at very high output rates.

Products handled on automatic pouch-packaging machines include liquids, semiliquids, powders, granules, tablets and hard goods. Feed mechanisms consequently include volumetric, scale, augers, liquid fillers, pocket delivery and count.

The chemical and physical properties of the product determine the type of packaging material that is best suited for the product. Most flexible heat-sealing materials are handled successfully on automatic pouch-packaging equipment—especially paper, cellophane, foil laminations and those plastic films that have a degree of body and stiffness similar to paper. With some films, including polyethylene and saran, there are problems—including some not solved—that require special attention in regard to handling characteristics or sealing.

Further engineering progress is expected to provide refinements in speed and flexibility of automatic packaging machines in general. In short, emphasis will be placed on the design of automatic machines that can handle diversified products at greater speeds.

In selecting equipment, one of the packager's first questions should be "Do I have, or do I anticipate sufficient volume to justify automatic packaging?" A second consideration is the long-range operating savings different types of equipment afford.



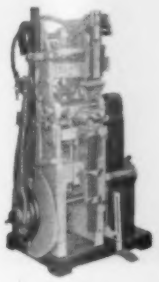
New machine automatically forms, fills, seals and counts tea bags.

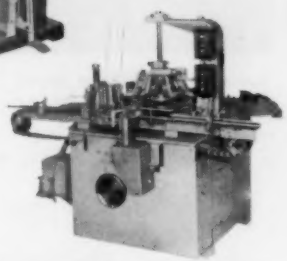
Pills, capsules, tablets are packaged at rates up to 600 a minute in pocket formed from heat-sealing material.

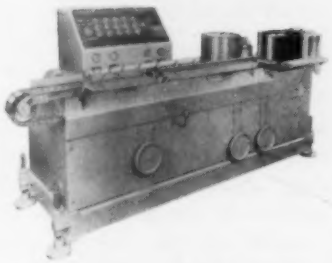


PHOTO COURTESY MURRAY-DAVIS CHEMICAL CORP.

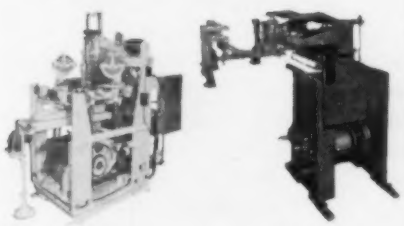
"FIRST THOUGHT" IN LABELING, CARTONING, BLISTER PACKS, TRAY MAKING, SET-UP BOX-MAKING:













Foods .. Drugs .. Chemicals .. Cosmetics .. Beverages

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- *CARTONING:* Equipment for setting up collapsed cartons, conveying them for vertical hand-filling, and tucking in or sealing the cartons—a wide range of sizes handled, quick change-over for short runs . . .
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556

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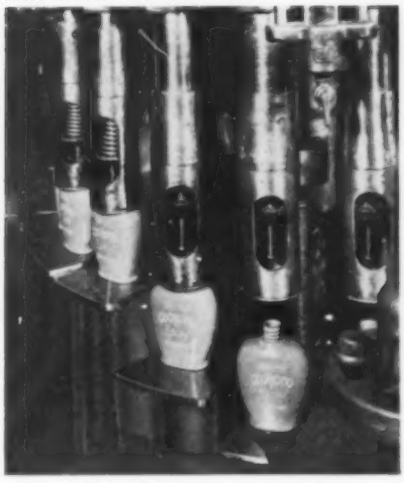
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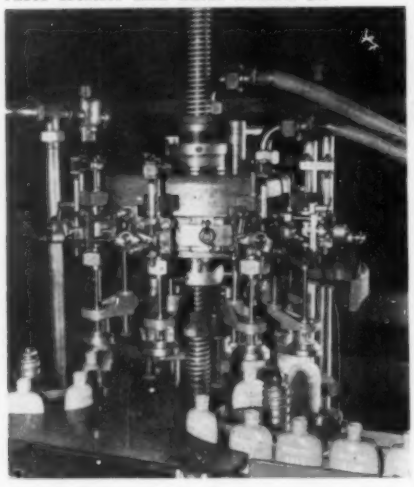
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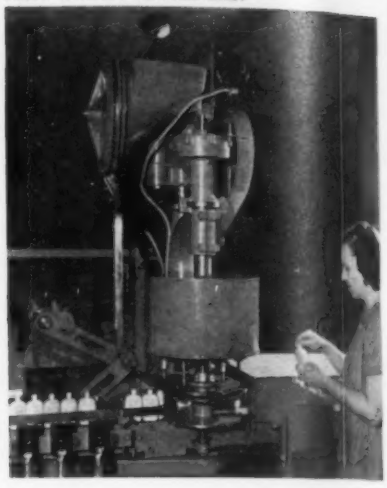
Gravity-vacuum filler designed to prevent leakage and denting has screw-type infeed and a turret discharge. Handles more than 120 units a minute.

PHOTO COURTESY KARL KIEFER MACHINE CO.



Pump-measurement rotary machine fills squeeze bottles from bottom up. Nozzles retract with the fill, thus keeping the necks of the containers clean.

PHOTO COURTESY STANDARD-KNAPP



Automatic plugger sorts, feeds plugs; then plungers drive plugs into necks of bottles. Machine was adapted from a pharmaceutical glass vial plugger.

Squeeze-bottle packaging

The selection of equipment for filling plastic bottles is based on factors involving product characteristics and shape and wall thicknesses of the container. Types of filling equipment used include (1) gravity; (2) gravity-vacuum; (3) vacuum; (4) pressure-vacuum, and (5) volumetric, piston-plunger or chamber fillers. No one type provides all the answers; each has advantages and limitations regarding speed, freedom from bottle collapse, accuracy and cleanliness.

Since the design of a bottle is an important factor in successful handling on automatic equipment, the packager would do well to consult machinery manufacturers (before molds are made) and select a bottle designed for automatic machinery.

Capping equipment does not often present problems with polyethylene bottles, but it is well to bear in mind when using automatic high-speed cappers that, if the bottle-gripping jaws apply too much force against the bottle side walls over too small an area, the bottles may be slightly deformed, causing the neck to tip at an angle. Where tamperproof packages are required, machines are available for heat sealing friction-fit plugs into plastic bottles. Special machines insert tubing into spray plugs. These machines are semi-automatic and they produce more uniform spray at reduced cost and higher production.

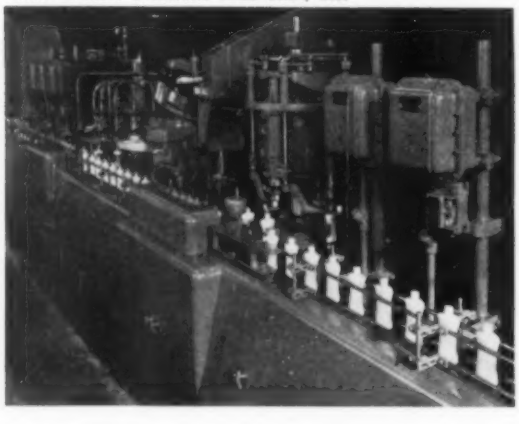
Where several operations, such as bottle cleaning, code dating, plug insertion and capping, are combined with filling, special filling-line equipment has been built incorporating linked-together pockets which are attached to a continuous belt. All operations are geared to the one-belt drive and the pockets are shaped to conform to the shape of the bottle.

Some of the unique, functional qualities of the squeeze bottle are also its problems. Its light weight, its flexibility, its means of dispensing an automatic spray can mean difficulties on the packaging line. Special fittings may be required on conveyor belts to keep the featherweight bottles from toppling. A gentle touch is required for a container that may, if gripped too hard, collapse when empty, or squirt when filled. There is also the new packaging problem of assembling capillary tubing precisely in plugs and seating the plugs.

As attention has concentrated on these problems, solutions have been found. The last barrier to fully automatic plastic-bottle packaging lines may be eliminated when and if machines can be developed to cut tubing to length, insert the tubing in the spray plug, insert the assembled plug and tube in the bottle, force home the plug and finally squeeze the bottle to check the spray. Machines to perform these chores are under development.

Although much progress is being made, mechanization is by no means universal. Only a handful of larger companies have achieved a measure of it. But the important point is that precepts have been established.

PHOTO COURTESY PNEUMATIC SCALE CORP., LTD.



Handling and synchronization of squeeze bottles through cleaning, filling and closing are important factors on the high-speed line. Since bottle shapes and designs are such that they tend to crowd up and cause tipping or mis-timing, synchronized conveyors, special pockets or close-coupled machines are used.

PETERS ANNOUNCES NEW 'PROFIT NOW' PLAN FOR PACKAGING MACHINERY USERS

Offers choice of Leasing Plan, Long-Term Financing or Outright Purchase

(Chicago, Illinois)—A new, 3-way plan for obtaining money-saving packaging machinery *without delay* is announced by H. Lyle Greene, president, Peters Machinery Company. It is called Peters' "Profit-Now" Plan.

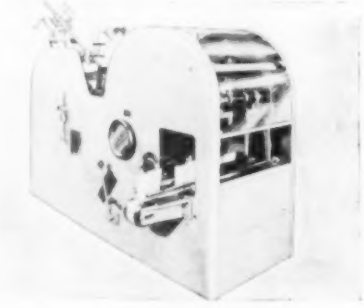
The plan gives you an opportunity to finance your purchase of packaging equipment (1) on a leasing basis, (2) on deferred payment, or (3) on outright purchase. The plan you use can be tailored to fit your exact needs.

Leasing Plan

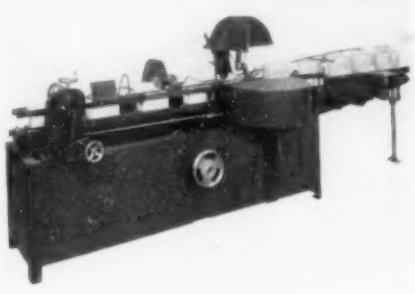
An increasingly popular leasing arrangement has many advantages, particularly when larger equipment or several machines are required.

With a lease, no initial payment is required, thus conserving working capital and fully expensing monthly rental costs. Since leasing is an operating expense, costs are deductible *before taxes*. Thus, leasing enables you to conserve net income and to gain working capital from your own balance sheet. Working capital is not tied up in fixed assets. This allows expansion out of earnings, as approved by leading banks and insurance companies.

Leases may be spread over a period of three to ten years, depending upon your requirements, and upon the equipment leased.



Peters Model SE Carton Forming & Lining Machine



Peters Model CCY-L Carton Folding & Closing Machine

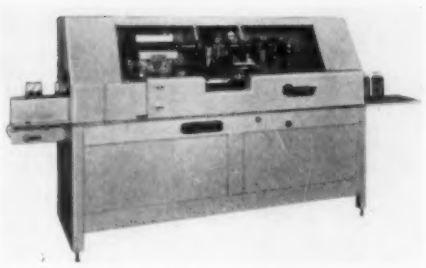
Long-Term Payment Plan

This plan allows you to pay as you profit through deferred payments. You simply make a down payment (usually 1/3) and carry the balance over a convenient period. Obviously, you pay for equipment out of earnings. You conserve working capital. Many times you can obtain equipment needed without extending your budget or extending your cash on hand.

Outright Purchase

An outright purchase plan, of course, is the tried and true method of transacting purchases. Wherever earnings or working capital balances justify cash outlays it is usually advisable to use an outright purchase plan.

While leasing is not recommended for smaller, low-cost machines—all Peters equipment may be purchased on deferred payment. For complete information regarding Peters' "Profit-Now" Plan, write or phone. All inquiries will be treated confidentially.



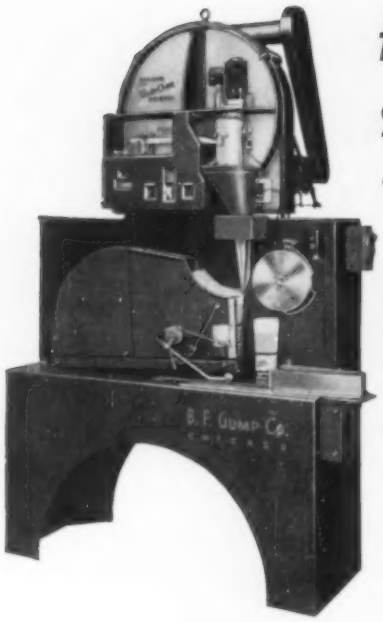
Peters Model L-2 Bag Sealing & Header Applying Machine

Peters Model SG Carton & Tray Forming & Gluing Machine



Peters MACHINERY COMPANY

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BAR-NUN AUTOMATIC BAG FEEDERS, OPENERS AND WEIGHERS.

Automatically Feed, Open, Weigh-Fill and Eject Paper Bags.

BAR-NUN Automatic Bag Feeders, Openers and Weighers automatically perform SIX packaging operations. Bags in magazine are: (1) Fed, (2) Opened, (3) Held, (4) Weigh-filled, (5) Released, (6) Ejected. Operation is speedy and dependable. Big savings are effected through extreme guaranteed accuracy of the Bar-Nun "Auto-Check" Weigher, and labor reduction.

Also available with bag packing, folding and closing unit for plain and lined kraft bags. Speeds up to 30 complete packages per minute.

BAR-NUN "AUTO-CHECK" WEIGHERS.

Extreme Consistent Accuracy Guaranteed

BAR-NUN "Auto-Check" Net Weighers are recommended for weighing powdered and granular products, and are available in three sizes for weights from as little as ¼ ounce up to 5 pounds per discharge. Extreme accuracy is *guaranteed*. Features include check-weight pointer and dial, instant weight setting, and trip lever control, either manual or timed.

The new Bar-Nun "Twin-Beam" Net Weigher is for similar products, but for high speed packaging lines where extreme accuracy is required. Suitable for multi-unit installations for can and jar lines.
Maximum Variations:

- Up to 8 ounces, plus or minus 1/64 oz.
- Up to 1½ pounds, plus or minus 1/32 oz.
- Up to 5 pounds, plus or minus 3/32 oz.





B-4 Disc-Type Edtbauer-Duplex Net Weigher

EDTBAUER-DUPLEX AUTOMATIC NET WEIGHERS

A simple, dependable Net Weigher for automatic, continuous discharge of dry, powdered, granular or flaked materials. Available in five sizes with capacity ranges from 4 ounces to 50 pounds per discharge, and in four models: gravity feed for free-flowing materials . . . pin-type power feed for powdered and granular materials . . . disc-type power feed for pellets and larger size materials . . . and either of the above power feeds with electrical discharge controls. Edtbauer-Duplex Automatic Net Weighers have a low first cost and practically no maintenance expense.

At right: Edtbauer-Duplex Weigher, electrically synchronized with the Gump Conveyor and Timer, for cartons, cans or jars. Operations of filling and conveying containers to the closing station are completely automatic. A practical and economical unit for the small package line.



Gump Conveyor and Timer, with No. A-1 Pin-type Power Feed Edtbauer-Duplex Weigher. For cartons, cans or jars.

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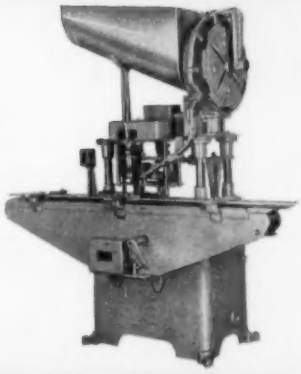
Tops them all

A model for every purpose... A speed for every need!

CAPPERS

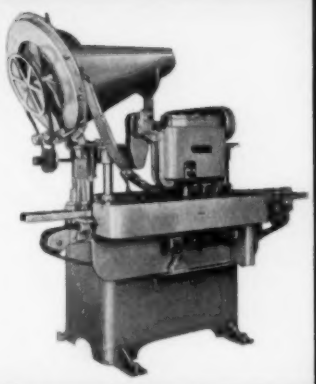
RESiNA

Standard, single head
Automatic screw capper
Capacity:
up to 60 per minute.



RESiNA

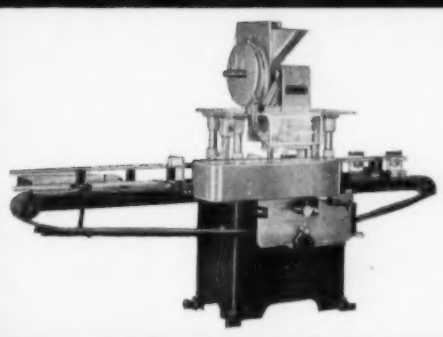
High speed, straight line screw capper. Rated for speeds up to 300 per minute depending on size of container and cap. Flexible. Fast. Fully Automatic



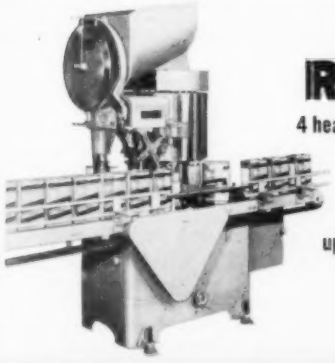
NEW! INNERSEALER

RESiNA

Automatic innerseal machine for selecting and applying standard innerseals to various types and sizes of tin cans as commonly used in the oil industry.
Capacity: 60-120 per minute.



NEW! CAN SEALER



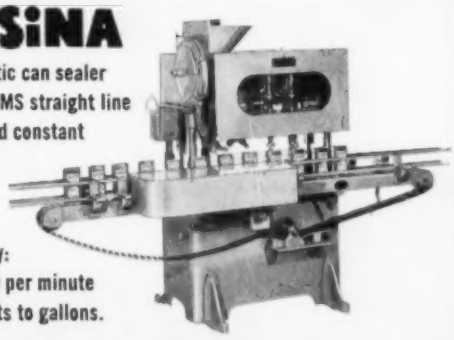
RESiNA

4 head rotary automatic can sealer
Model SRA
Capacity:
up to 100 gallons per minute

RESiNA

Automatic can sealer
Model CMS straight line two head constant motion

Capacity:
up to 60 per minute
half pints to gallons.



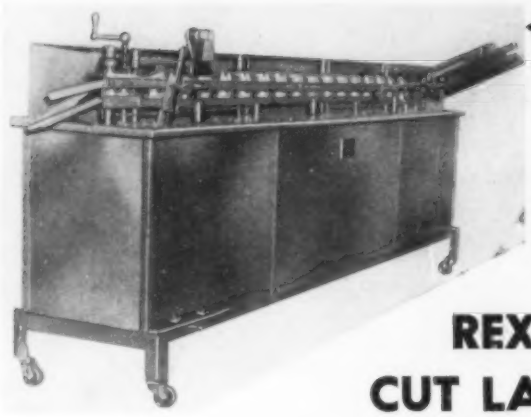
ALSO SPECIAL MACHINERY

Agents in principal cities throughout the United States and Canada.

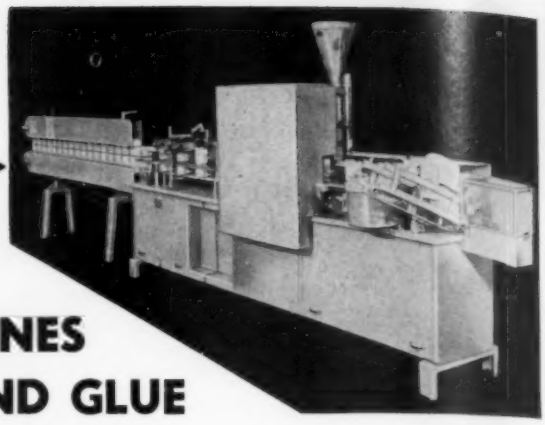
Write for descriptive literature

RESiNA AUTOMATIC MACHINERY CO., INC.

Brooklyn 31, New York



The Rex Model 22VTT Cartoner. Notice the efficient straight-line transportation of packages.



The Rex Model 32VGG complete with automatic filling equipment.

REX MACHINES CUT LABOR AND GLUE COST SUBSTANTIALLY

LOWEST COST—HIGHEST QUALITY

• The new design of the Rex Machines permits cartoning speeds up to 180 per minute. It's simplicity itself. Provides quick change-over and very flexible, straight line performance. It's ideal for short or long runs . . . handles almost any packaged item, either bulk or free-flowing. Units are fully or semi-automatic, and handle vertical or horizontal cartons . . . glue or tuck types.

The Rex Machines are operating very successfully with pharmaceutical, cosmetic, food, candy, tape, hardware, feed and other lines.

Write today for illustrated literature, and tell us your packaging problem.



Famous brands using Rex Cartoning Machines.

ECONOMIZE WITH "REX CARTONER" ON LABOR • GLUE COSTS • FLOOR SPACE

REX PACKAGING MACHINE CO.

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For packaging and bag making machines ...think of

HEAT SEAL-IT



HEAT SEAL-IT offers the experience of over 20 years in packaging. Pioneers of heat sealing, this accumulated knowledge is *yours* in any of the many Heat-Seal-It machines. Fast, dependable, efficient, you'll find a Heat-Seal-It machine for your job at a price you can afford! Write for detailed information, outlining your packaging problem.

LABEL SEAL-IT—Motor driven; seals bags, simultaneously attaches labels made from printer's coated enamel paper. Cuts label costs. Handles Polyethlylene, Saran, Cellophane, etc.

BAND SEAL-IT—High speed, Automatic. Seals Cellophane, Polyethylene, Pliofilm, etc. Speeds up to 600 lineal inches per minute or up to 150 bags per minute; conveyor fed. Also seals large sheets of film, plastics, barrier materials etc. into pouches and blankets.

THE PACER—Fast bag sealing with Phantom Feed, finger-touch control. Motor driven; handles up to 45 bags per minute. Jaw widths: 11", 15", 18", 22". Handles all heat sealable materials. Special models for Polyethylene.

MODEL 12F—Low cost, foot-operated machine for small production requirements. Handles all heat sealable materials. Special model for Polyethylene.

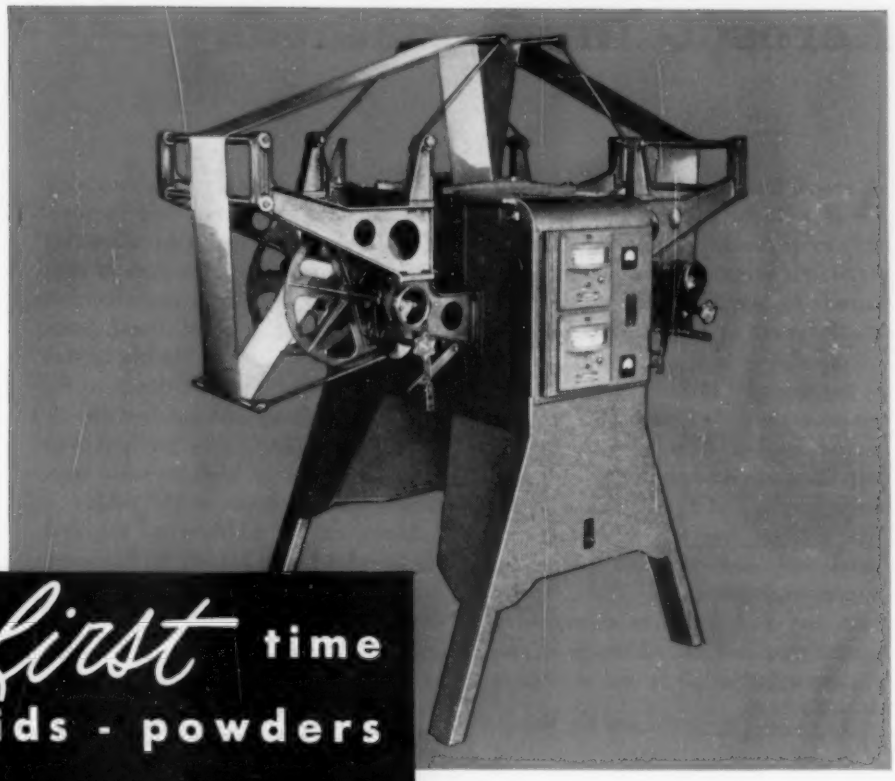
STRIP SEAL-IT—Seals small pharmaceuticals, etc., between two continuous strips of cellophane, foil, etc., in individual pockets.

AERO SEAL-IT—Portable, pneumatically operated. For large barriers and other sealing operations where work can't be easily moved.

BAG MAKE-IT—This machine automatically produces from 30 to 50 bags per minute from heat sealing material. Motor driven.

★ GLOBE ★
HEAT-SEAL, INC.
HEAT SEAL-IT DIVISION

GLOBE HEAT-SEAL, INC. | 3372A S. Robertson Blvd. Los Angeles 34, Calif.



for the *first* time
solids - liquids - powders
packaged at speeds up to
400 PER MINUTE
on a single BELL-*Pak* machine

Whether you use heat sealing film, foil or any laminated material, flexible packages *are made as they are filled . . .* at *speeds up to 400 per minute!*

Whether your product is a liquid, cream, powder, solid, or semi-solid, it can be packaged on a single Bell-Pak Machine — *within an accuracy of plus or minus 1%.*

Different items . . . different sizes . . . can be packaged *simultaneously . . .* or individually, with package sizes ranging from ¾″ wide and 1¾″ long, to 9″ wide and 14″ long.

No cams or dies to adjust, package size changes can be made in minutes by unskilled operators. Complete automatic heat control, variable speed drive permits maximum speed in relationship to material and production.

Send a sample . . . of your package,
your product . . . your problem.

Your costs, your packaging speed will be demonstrated on an actual "production run" of the Bell-Pak Machine. Address your inquiries to:

BELL·*Pak* A DIVISION OF
THE BELL MACHINE COMPANY
Designers and Builders of Precision Machinery since 1907
OSHKOSH, WISCONSIN

Aerosol-filling methods

by A. J. WAGNER*

Aerosol loading, as it is done today, is a highly specialized business and, as present practice indicates, a very large volume of production is required to justify economically the establishment of a loading plant.

Cold filling is the method used to fill the majority of low-pressure (average pressure 25 psi) aerosols currently on the market. The ingredients and propellant are refrigerated to sub-zero temperatures and handled as a liquid. This method has the advantages of speed and that sufficient propellant evaporates between the filling operations and the sealer to displace all water vapor and air. Although in certain formulations it is not necessary to remove air from the containers, it sometimes is dangerous and removal of the air helps maintain allowable ICC limits. Another advantage of cold filling is that automatic machinery is available. On the other hand, such installations represent a sizable investment. Moreover, they are designed for relatively high-volume production.

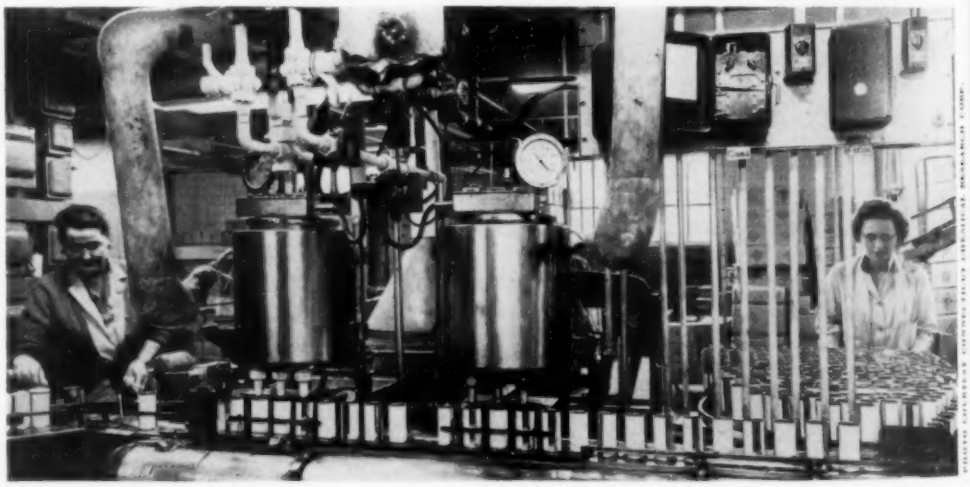
Pressure filling. This method was originally used in high-pressure containers with pressures to 100 psi.

However, in addition to the few insecticides being loaded in this manner, pressure filling is more often used where the active ingredients are cold sensitive. Foam products, such as shaving creams containing emulsified materials which cannot withstand sub-zero temperatures, are packaged by this method. And recently ultra-low-pressure glass-aerosol perfumes, colognes and pharmaceuticals are being pressure filled. With the pressure method all air must be evacuated from the container. Perhaps prime disadvantages of pressure filling are that the operation is slower and the propellant waste factor higher.

With the advent of glass aerosols and dry powder aerosols, it appears that even more equipment will be necessary to fill all types of products.

It must be remembered that, in addition to filling machines, equipment such as crimpers, seamers, refrigeration, heat exchangers, blowers, driers, labelers, cranes for handling propellant cylinders, conveyors, unscramblers, leak test tanks and gassers is necessary.

*Vice President, Fluid Chemical Co., Newark, N. J.



Heart of a refrigerated filling line. Under stainless-steel tank at right cans are filled with active ingredient; then move to second tank where liquid propellant chilled below its boiling point is filled into can. Woman at left inserts the lid and the valve.

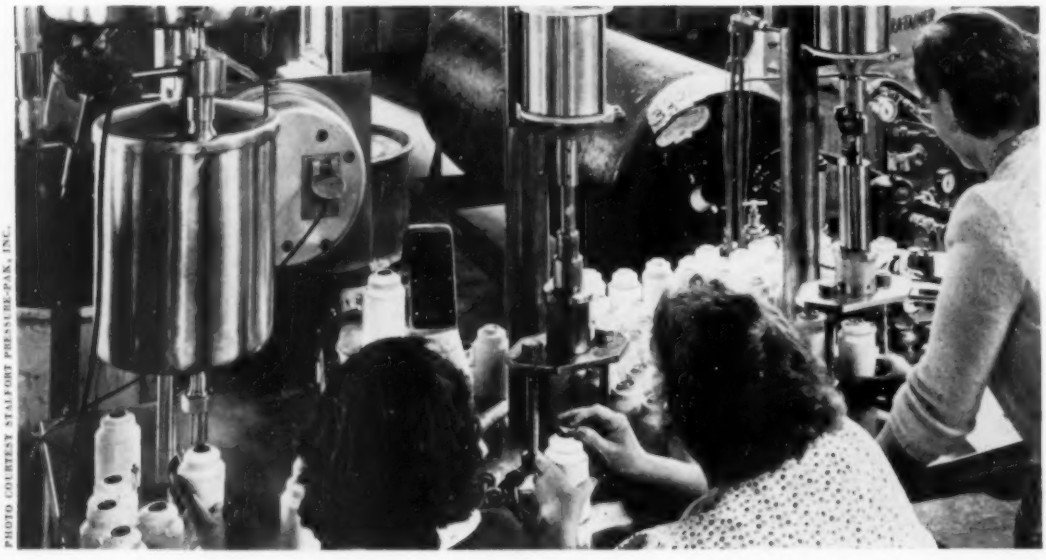
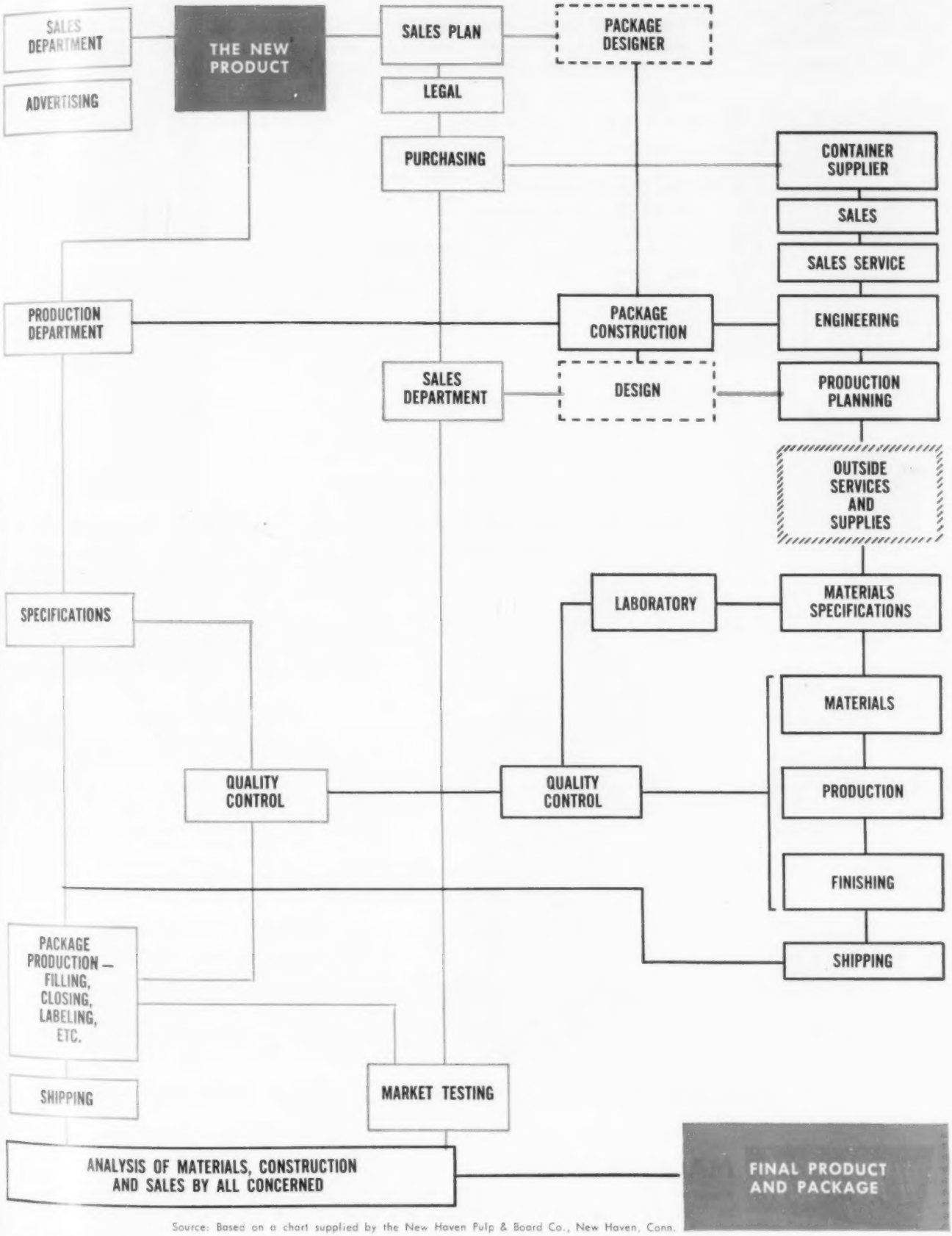


PHOTO COURTESY STALFORT PRESSURE-PAK, INC.

Typical pressure load system. Under tank at left active ingredient is filled into can. Operator at center station crimps on valve assembly; then propellant, held in liquid state under pressure, is forced (in operation at right) into the orifice of the valve.

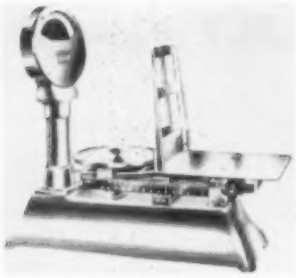
PACKAGE DEVELOPMENT CHART



Source: Based on a chart supplied by the New Haven Pulp & Board Co., New Haven, Conn.

Customer Function ——— Supplier Function - - - - Supplied by Packager, Supplier, or an Independent Designer.

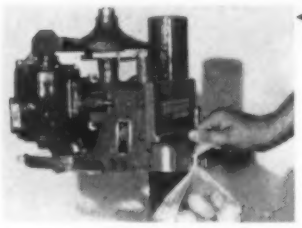
TRESCOTT
CONSUMER PACKAGING EQUIPMENT



SWIFT WEIGHT Scales — Fast reading, sensitive, accurate. For checking predetermined weights.

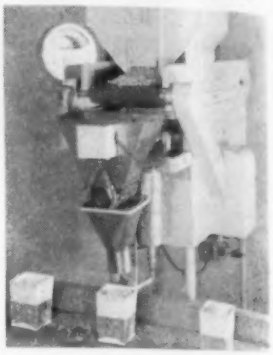


CODE MARKER with VACUUM BAG LIFTER. Code marks bag or sheet (plastic or paper), lifts and holds it ready for operator. From 2 to 5 code numbers or letters available on stamp.



BAG CLOSING MACHINE. Entirely new; safe, sure, fast. For plastic bags.

TRESCOMATIC For free-flowing and semi-free-flowing material. Completely automatic or manual. Weighs 8 oz. to 25 lbs.



Trescomatic WEE SCOTT (not shown). Extremely accurate, guarantee within ⅛ ounce. 1½ oz. to 6 lbs.

TWO BELTER special weighing and filling machine. Completely self contained, portable. Weighs 8 oz. to 25 lbs., automatic or manual. Wrapped candies, material that's difficult to move, cookies, marshmallows, etc.



●

Many fast efficient packaging lines have been designed by Trescott at surprisingly low cost.

Write or phone for full information

The TRESCOTT CO., Inc., Dept. MP, Fairport, N.Y.

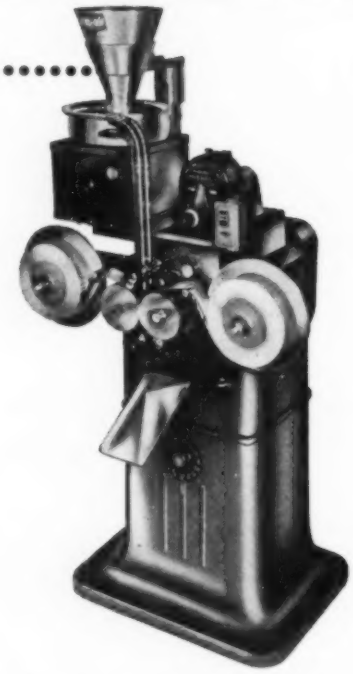
SAMPLE PACKAGES



Registration of printed material is possible with Wrap-Ade Unit Packagers.



Feed system is available for packaging LIQUIDS—such as Soy Sauce, Ketchup, etc.



WRAP-ADE
Automatic UNIT PACKAGERS

WRAP-ADE Unit Packagers are versatile, low cost machines designed specifically for faster packaging with less waste. They perform an entire cycle of packaging operations including feeding, filling, forming and sealing practically every type of heat sealing materials.

TABLET PACKAGER

Packages *Tablets, Capsules and Coated Tablets* efficiently and economically. Double Feed Tracks permit speeds in excess of 300 units per minute, within dimensional limits of product. This machine has proved itself in some of the largest pharmaceutical companies, where it is preferred for its speed, simplicity and superior construction.

OTHER MODEL UNIT PACKAGERS AVAILABLE FOR ALMOST ANY SMALL ITEM

Send us a sample of your product today for our prompt quotation.

wrap-ade **MACHINE CO., INC.**

Manufacturers of Packaging Machinery for over 20 yrs.

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Check list for machinery

THIS check list presents the composite judgment of more than 60 production managers and other production executives as to what items should be considered when packaging equipment is to be purchased. The list originally appeared in a report issued by the Production Line Committee of the Packaging Institute and is reprinted here through the courtesy of that organization. Not all the check points will be applicable in every instance, but careful consideration of each item or factor will help assure the inclusion of all elements that should be covered when plans are made and orders drawn up for the purchase of new or replacement equipment for the packaging line.

A. Physical detail

1. Name and model
2. Right- or left-hand operation
3. Materials of construction
   - Regular
   - Special for contact surfaces
   - Special for wearing surfaces
   - Special for pumps
   - Special for piping and valves
   - Special for gaskets
   - Other special requirements
4. Electrical requirements
   - Voltage, etc.
   - Underwriter's classification
   - Motors—manufacturer, capacity
   - Starters—manufacturer, capacity, location
   - Switches—manufacturer, capacity, location
5. Lubrication requirements
   - Fittings
     - At point of use
     - Central location
   - One-shot system
6. Safety requirements
   - State, local, plant
7. Paint: type, colors
8. Special items
   - Shrouding
9. Auxiliary equipment
   - Variable-speed drives
     - Speed range
   - Pumps
     - Pressure, capacity, type
   - Vacuum pumps
     - Vacuum, capacity, type
   - Clutches
   - Heaters
   - Counters
   - Indicators
   - Microswitches
   - Electronic controls
   - Timing dials
   - Tachometers
   - Other devices

B. Change parts

1. Quantity of change parts required
   - Individual parts or sets
2. Marking
3. Interchangeability
4. Time required to change over
5. On delivered equipment
6. Shipped separately

C. Engineering data

Installation and interconnection

1. Equipment
   - Floor plan
   - Elevation view
   - Assembled weight
   - Floor loading
2. Details of interconnection
3. Limiting factors affecting installation
   - Doorways and halls
     - Heights
     - Widths
   - Elevator capacities
   - Floor loads

D. Operation

1. Description of job expected
2. Speed of operation
3. Tolerances allowable
4. Efficiency expected
   - Defined as to speed
   - As to period of time
   - As to acceptable quality
5. Test at manufacturer's plant using actual materials
6. Packaging materials to be used on equipment
   - Specifications
   - Samples
   - Special precautions
7. Operators
   - Number required
   - Skills that will be necessary
   - Men or women operators

E. Delivery

1. Delivery date, guaranteed
2. Method of shipment
   - Rail—ski—knocked down
   - Truck—crate—assembled
3. Positioning and uncrating

F. Installation and test period

1. Supervision of manufacturer's engineer
   - Installation, start-up
   - Instruction and operation
     - To operators and mechanics
   - Testing
2. Installation
   - Labor and materials by buyer
3. Test period
   - Time for guarantee to be met
   - Cover change parts or special agreement

G. Manuals and data

1. Operating manual
   - Operating instructions
   - For specific model
   - Illustrated
   - Change-over instructions
2. Parts manual
   - For specific model
   - Illustrated
   - Change parts included
   - Parts stocked by manufacturer
   - Assembly drawing
3. Wiring diagrams
4. Lubrication manual
5. Data for timing charts

H. Guarantee against

- Defective workmanship
- Defective materials
- Patent claims

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Listings do not necessarily cover entire lines of advertisers nor all producers in each category.

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Equipment for marking

by IRA GOTTSCHO*

This article is a review of the chief purposes of package marking and the methods of marking packages efficiently and economically in the light of today's conditions.

In general, the retail unit is marked to identify the product or to date the package or its contents. The shipping container is marked to identify the contents, the addressee and provide special shipping or handling instructions. The same product unit may be marked in several ways for a number of different purposes and at different stages of production.

Contents identification and information. Where a single product is made, without variation in size, color, flavor, etc., a standard printed container or completely pre-printed label provides identification. However, where variations occur in product or brand, or where entirely different products will be packed in the same style of container, the manufacturer will do well to differentiate among them by marking or imprinting either the package or the label as part of his regular production procedure. For example, an extensive line of auto parts sold under the same trademark uses package markings to save time and money. Instead of buying special packages for each product in the line, the manufacturer planned a minimum number of carton forms and sizes to accommodate all the different parts he makes. These cartons are printed with an identical trademark design that promotes the family relationship, but have blank panels which are imprinted by the manufacturer, at the time of filling, with the name of the item packed.

In the same way a face powder packaged in a standard powder box is identified as to its particular color (after or before filling) by marking the shade name in a panel left blank on the box label. The same is done with stocking packages, which need varying size and color notations on the retail box of three pairs.

Or a baker who must make a listing of ingredients on his packages, as required by law, can easily alter the imprint when circumstances dictate formula changes. Thus he is able to comply with legal requirements yet does not have to hold up production awaiting the arrival of new packages.

Price marking also belongs under this heading. Price marking figures importantly in merchandising today as a result of the growth of chain and supermarket operations and of large-scale pre-packaging.

Code dating. There are many reasons why packagers code date their products as a regular step in the production process:

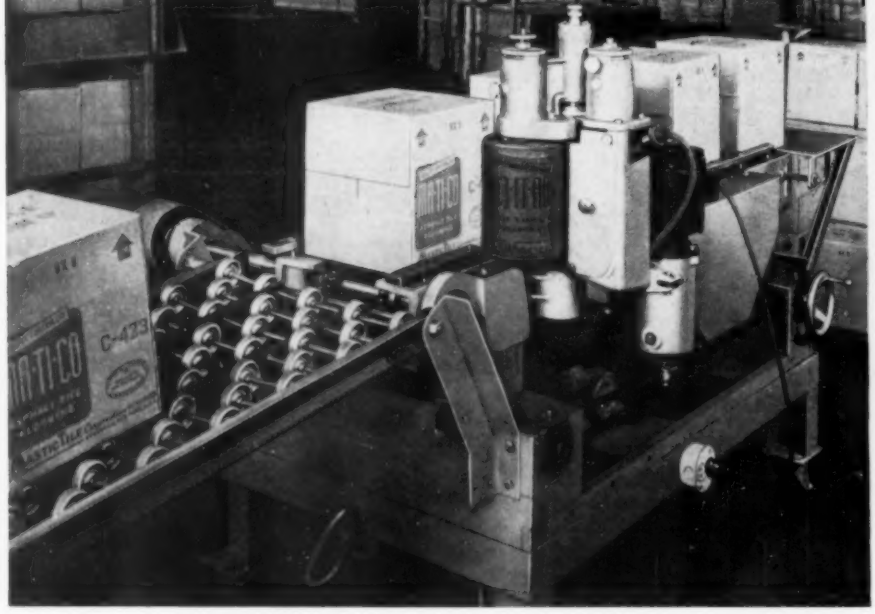
First of all, there are legal requirements. For certain products a code date on the package is required by the Food and Drug Administration or by similar policing agencies within the states. Generally, these agencies stipulate a code mark indicating the batch number and packaging or expiration date. As legal protection, too, code marks have provided useful evidence to some manufacturers faced with a lawsuit for alleged product adulteration, when it could be shown that other units bearing the identical code mark were pure.

Manufacturers have found that a properly maintained system of code dating pays dividends in terms of low liability insurance premiums.

Proper code dating implements the unending search for absolute quality control at various points in the manufacturing and distributing process. There is no easier way to sort good from bad—when an accident or error results in a substandard batch—than

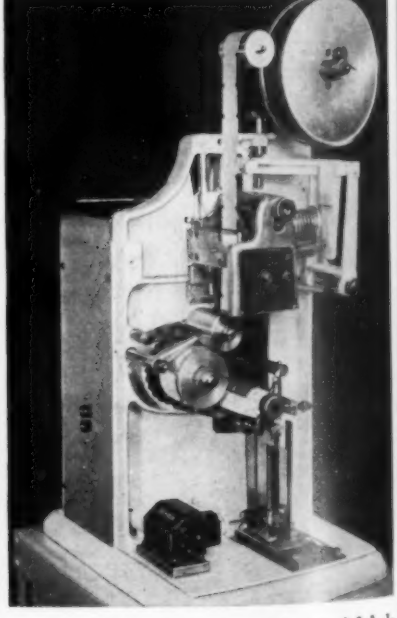
*President, Adolph Gottscho, Inc., Hillside, N. J.

PHOTO COURTESY ADOLPH GOTTSCHO, INC.



"Markoprinter" has 2,000-per-hour capacity, reproduces one- or two-color copy on one to four sides of filled fibre or wooden shipping cartons and cases.

PHOTO COURTESY OLIVER MACHINERY CO.



Imprinter produces heat-seal labels for cellophane-wrapped packages.

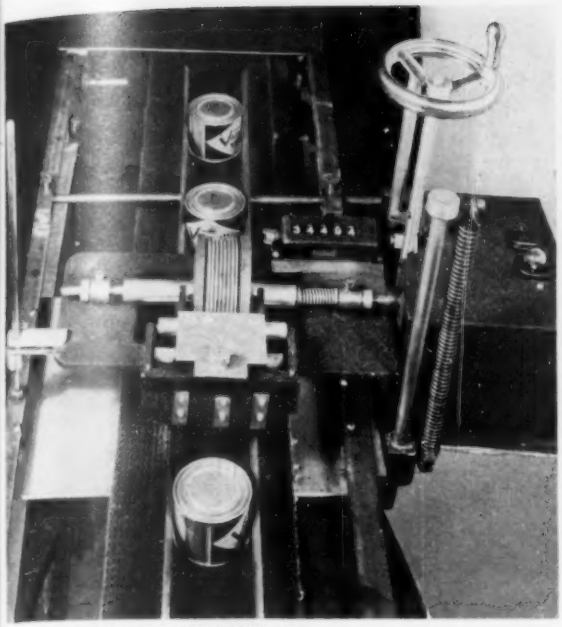


PHOTO COURTESY ALGENE MARKING EQUIP. CO.

Coding and printing machine is adjustable for marking tops of various packages, installs on conveyor. Marks up to 90 cans per minute.

This machine feeds flat panels and other flat objects up to ¾ in. thick; prints and ejects them. Speed of machine, up to 180 objects per minute.

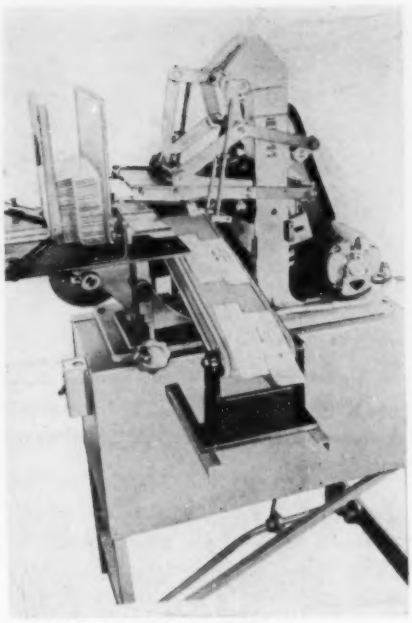


PHOTO COURTESY MARKEM MACHINE CO.

by referring to a coding system that identifies each batch. Many a company has suffered the loss of its entire stock because a small part of it was defective but could not be segregated from total inventory.

A vital link in quality-control testing of a product by run-of-the-mill spot checking at various times during and after processing is provided by the code mark and the code system. By maintaining a coded pedigree on each batch, which covers not only raw materials, but processing conditions, container source, significant product characteristics, etc., it is possible to refine quality standards.

The validity of consumer complaints of product quality can be checked by the package code mark, which makes it possible to locate other goods in the same batch and to check back on the processing, the materials or the personnel employed in its processing.

Since proper coding can identify the personnel working on specific batches or lots of a product, it is possible to single out employees who through negligence, incompetence or for other reasons are consistently associated with substandard lots, short packing counts and the like.

Machine efficiency checks are also possible using the code date as a guide. By identifying the production line used on a given batch, it is possible to trace substandard operations right back to their source.

Proper inventory control through code dating is also facilitated on every level of the production and distribution. In fact, code dating is a necessity for products with a short or predetermined shelf life, which must be coded so that the manufacturer can recall merchandise that remains unsold after a specified period.

"First made, first out" is the distribution policy of most manufacturers, distributors and retailers in any case. But unless a system of coding exists to identify each lot on the product's shipping container, control is next to impossible. Regulated flow, according to dates of manufacture—out of warehouses into dealers' hands and from dealers' stocks onto shelves—calls for coding the container.

The code mark also enables the re-

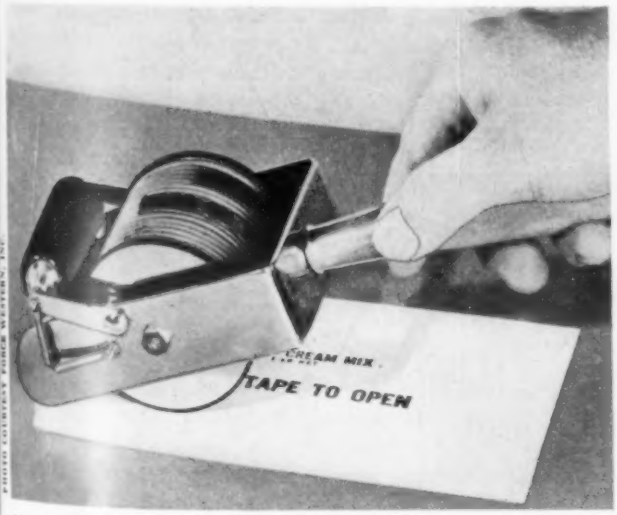


PHOTO COURTESY PIRIE WESTERN, INC.

Hand-operated unit rolls marking on boxes or cartons. Base-lock interchangeable type is used on the unit.

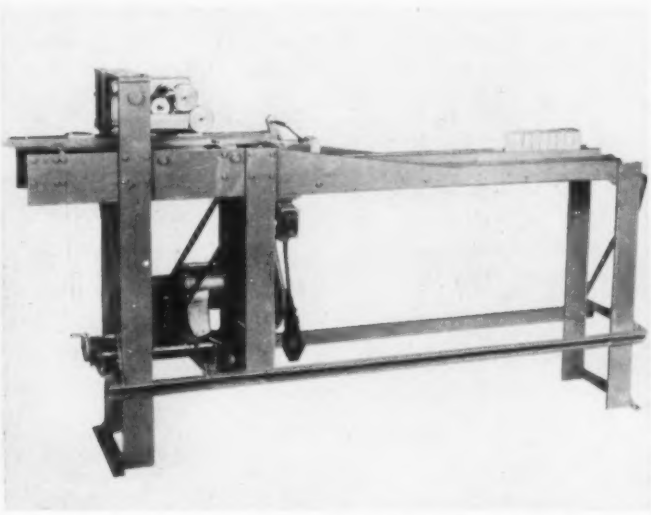


PHOTO COURTESY INDUSTRIAL MARKING EQUIPMENT CO., INC.

Coding machine is designed to imprint small cartons at a rate of 70 per minute; uses changeable rubber dies.



PHOTO COURTESY MOBAR CO.

Labels are printed, counted, stacked by the automatic label marker shown.

tailer or dealer to keep oldest goods out front on the shelf, newest behind.

The value of code dating raw materials and empty containers at the time of receipt is acquiring greater recognition as an essential step in a comprehensive quality-control program. Coding identifies the source, date of receipt, the inspector and provides other vital information.

The code mark makes a useful tool for the manufacturer's sales department. It is possible using the code date on the retail package to check turnover in the retail outlet; to establish sales quotas; and to ascertain the points at which special sales efforts will result in maximum sales.

Methods of marking

The primary package. Regardless of the type of package—bottle, jar, can, carton, etc.—there are three package parts that can be marked: the label, the package surface or the package overwrap.

The packager can mark labels before they are applied or as part of the packaging operation. A number of machines will take labels of various sizes and shapes in bulk for either imprinting or perforating variable contents information, codes, or control numbers. These machines operate semi-automatically or automatically and deliver marked labels ready for feeding to a labeler. Other machines, handling labels in rolls, have imprinters incorporated for marking different product names on the same roll.

Labels can also be marked during the packaging operation, after they have been applied to the container. Friction-powered, cam-powered and solenoid-operated units print on labels as the packages move along the production line. Electrically heated units "brand" a small imprint on the label surface.

Complete packages or their parts can be marked as an independent production operation. For instance, can covers are embossed with variable codes before they are fed to capping machines. Bottle hoods, container caps, headers for flexible bags, flat cartons, etc. also can be handled by machines made specifically for marking before actual packaging.

In many cases, particularly where large-run production is the rule, industry is turning increasingly toward methods of marking as an integral part of the packaging operation. This method eliminates a production step and is more economical as well as accurate. Many large packagers have made changes in their packaging lines to accommodate machines for synchronized imprinting. Some of these machines fit into a line just like capping, cartoning or filling units. They imprint with printing-press quality.

The increased requirements for showing code dates on packages have spurred the development of devices that are incorporated in the packaging machine. Cartoners, tube fillers, heat sealers, case sealers and other package-making machines are

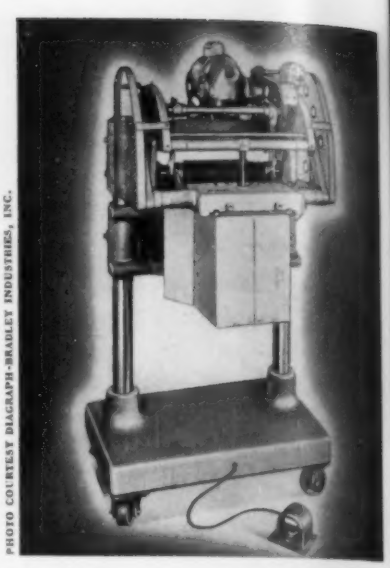


PHOTO COURTESY DIAGRAPH-BRADLEY INDUSTRIES, INC.

Hand-engraved or molded dies and logotypes can be used on this carton imprinter, which is portable.

available with imprinting, indenting or perforating units.

Often, particularly on case-sealing machines and conveyors, it is practical to use one of the various types of inexpensive friction-operated attachments that mark packages while they are moving along the packaging line.

The growing use of overwraps in fields like frozen foods has made it desirable to mark the wrap material while it is being unwound on the infeed of a wrapping machine, since it is impractical in the required production set-up to mark the finished package. Until recently, the stocks used in such overwraps—cellophane, waxed paper, glassine, foil and films—presented problems in obtaining permanent marking except by perforating. But there are now on the market machines capable of handling the special inks required for fast drying and permanent adhesion to such surfaces.

The shipping container. Most shipping containers are either cases of paperboard or wood—or drums of metal or fibreboard. Common marking requirements include shipper identification, addressee information, contents identification (lot number, serial number) and handling instructions.

For marking these containers a number of methods are available. The packager has a choice of stencil-making equipment, both mechanical and electric rotary imprinting devices; metal tag embossers that are fed from the roll; hand duplicators that take typewritten stencils; and numbering machines.



PHOTO COURTESY MARKEM MACHINE CO.

Flat surface printer prints complete label detail in one operation on boxes, saw blades, tiles, cans, etc.

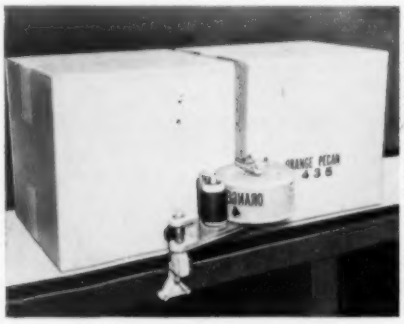


PHOTO COURTESY ADOLPH GOTTSCHO, INC.

Rotary marker for long cases attaches to conveyor or case sealer. Unit is designed for accurate registration.



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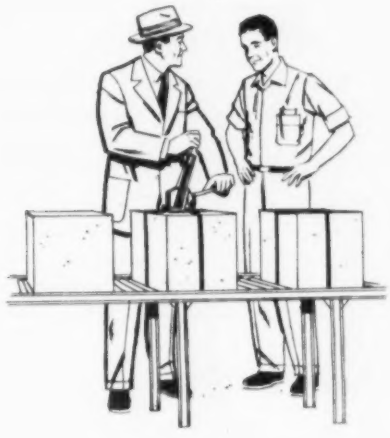
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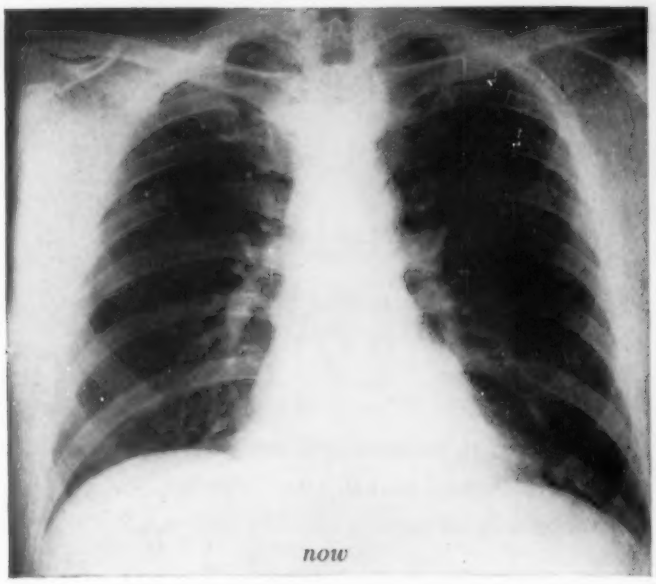
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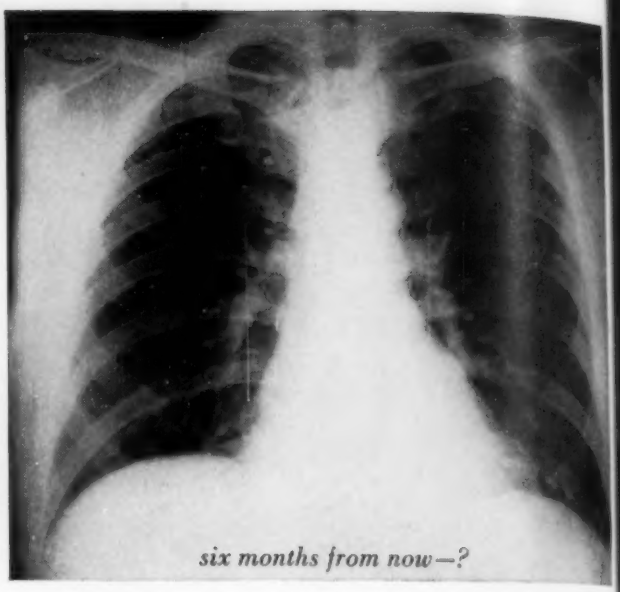


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Check weighing and inspection

by J. E. KONKLE*

Over the past 20 years, as packaging line speeds have increased, the problems involved in the selection and use of modern weighing equipment have become more complicated. Many factors must now be considered to determine the most suitable type of equipment required for a given operation. Among them are the following:

1. Weight of commodity
2. Size, shape and type of commodity
3. Container or receptacle into which commodity is placed when being weighed
4. Environment in which the scale will be used
5. Speed required
6. Sensitivity required
7. Accuracy desired
8. Tolerances to be maintained
9. Vibration present in area of scale
10. Dimensional limitations and requirements
11. Service requirements.

There are many kinds of scales designed to meet the varied requirements and conditions of industry. A discussion of the important types used in packaging follows:

Over and under scales. These are predetermined-weight, manually operated scales. They are equipped with a magnified dial and are designed so that the indicator travels 1 or 1½ in. to the ounce. These scales are found on all kinds of packaging lines. They are widely used in spot checking.

Random-weight (catch-all) scales, manually operated, measure actual pounds and ounces. A principal use in packaging is in the weighing of pre-packaged produce and meats. This type of scale is also available in models that compute costs.

Net-weighing scales. Semi-automatic types are designed to weigh a predetermined amount of commodity and dump or deliver the load to a receptacle. An operator is required to start the weighing cycle and on some machines to remove and replace the commodity receptacle. Fully automatic net-weighing scales weigh a predetermined amount of commodity and automatically dump the load, then start a new filling, weighing and dumping cycle. As the term implies, this type of net weigher does not require an operator. It is usually employed in conjunction with other automatic or conveyor-type systems. (See "Fillers for Dry Products," p. 392.)

Recently, a high-speed automatic net weigher operating on a new air-control principle has been introduced. Like other modern net weighers, this machine has been designed to meet the problem of higher production speeds without sacrificing accuracy. Significant performance is reported.[1]

Electronic, fully automatic scales. A predetermined-weight scale, fully automatic in design, it is directly inserted in a conveyor-type production line. It will automatically weigh, classify and sort the commodity into over-, under- and correct-weight groups. Each group is automatically diverted to a separate conveyor channel. The weight of each unit is counted and totaled on electromagnetic counters. Statistical-control equipment, comprised of an averager, a range computer and an automatic filler-correction system that receives package-weight signals from the electronic automatic check weigher, evaluates this information statistically and automatically adjusts the filler when necessary.

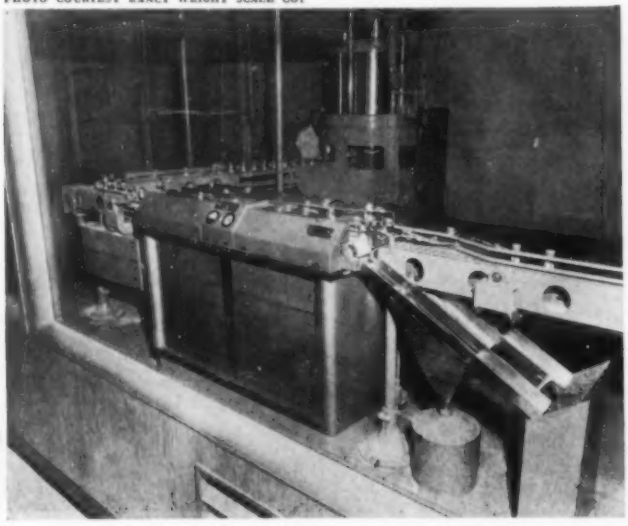
The automatic mechanical check weigher is a predetermined-weight scale, designed for direct insertion in a production line, which will automatically weigh, classify and sort the commodity into over-, under- and correct-weight groups. It is capable of handling similar commodities at a speed of 100 weighments per minute and of segregating the different weight groups into separate channels. Also, it is equipped with counters and indicating lights to total the number of packages in each group.

In the packaging field, where a great percentage of predetermined-weight manual scales are used, there has been a revolutionary change in recent years. The increased efficiency of machine packaging and self-service merchandising has resulted in a significant decrease in the costs. Tremendous strides have been made in retail packaging and the trend continues as more and more products are

* Electronics Dept., The Exact Weight Scale Co., Columbus, Ohio.

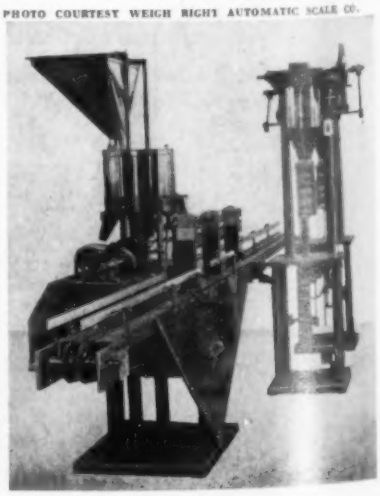
[1] See "The First Air-Control Weigher," MODERN PACKAGING, April, 1953, p. 122.

PHOTO COURTESY EXACT WEIGHT SCALE CO.



Automatic check weigher shunts off under and over weights, dumps contents of cans in jug on floor and chutes emptied cans to hopper at right for refilling.

PHOTO COURTESY WEIGH RIGHT AUTOMATIC SCALE CO.



Bulk-filled packages from auger packers or power fillers are brought up to weight on "finish" dribble-type filler.

distributed in package form. In addition, many new products, such as frozen foods, cake mixes and aerosols, have come on the market.

Problems of weight control

Management operating large-volume, high-speed packaging production lines has realized for some time the importance of fractional-ounce variations from the exact net weight upon which costs and selling prices are based.

Simultaneously with the knowledge of the importance of fractional-ounce variation in individual packages comes the realization that some method of correcting these weight variations is needed. The essence of control is to measure, compare and correct, and then check the results. However, to achieve control, you must first have the instrument to measure the product as it flows from the filling or processing machine.

Many factors cause package weights to vary. Typical of these factors are the following:

1. Changes in product density
2. Adjustment of filler
3. Uncertainty in cutoff of filler
4. Variations in amount of product in filler hopper
5. Changes in flow characteristics of product.

All resulting weight variations fall into one of two categories:

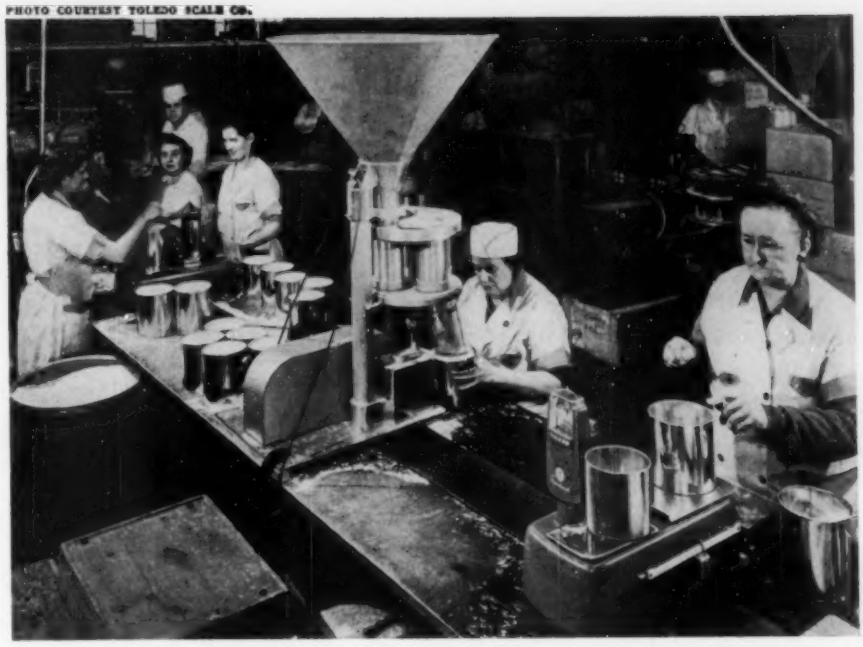
First, a *random* or pure-chance pattern, which causes the package weight to vary rapidly and results in weight variations between consecutive packages. This pattern of random variation is characteristic of a particular product and packaging process. In general, it can only be controlled through design and maintenance.

The second category concerns *trends* or variation in the weight of consecutive groups of packages rather than consecutive individual packages. Variation in density of product, between top and bottom of the hopper, is a good example of a cause of this type of variation. Segmenting of the filler hopper or stirring are typical of control methods that may be employed to eliminate this problem.

To control the weights of packaged products, it is important to distinguish between the two types of variation.

Any packaging process can be controlled to the weight tolerance dictated by the random variation. Proper control of the filling machine can eliminate the trends, with a consequent appreciable reduction in both over-all weight tolerance and loss of product through overfill.

PHOTO COURTESY TOLEDO SCALE CO.



Cans of soup mix are check weighed manually after addition of each ingredient. Over and under weights are visually recorded to 1/64 oz.

Both the electronic and the mechanical automatic check-weighing machines are the new scales developed to meet the challenge of today's high-speed production and weight-control problems. In either of these types the overweight and underweight units are shunted into separate channels and are conveyed to manual trimming stations, where they are "corrected" and placed on the correct-weight conveyor belt for continuation to the production line. Thus only a very small percentage of total production output requires handling and all the packages from the production line are of correct weight when shipped.

The basic function of the automatic check weigher is to check weigh 100% of the commodity units going down the packaging line and shunt off all over- or underweight packages. Equally important is the fact that its indicating lights and counters provide information that makes possible the establishment of a system of continuous manual control of filling equipment. Moreover, the operation of this control is almost instantaneous —a matter of seconds or less.

PHOTO COURTESY SCALE SPECIALTIES & SYSTEMS, INC.



Automatic weight calculator records day's over and under weights for quality-control inspector.

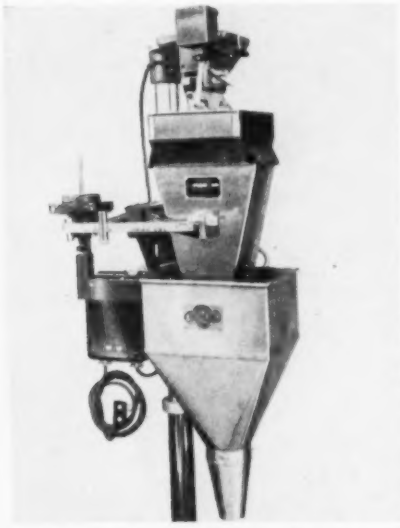


PHOTO COURTESY R. F. CLMP CO.

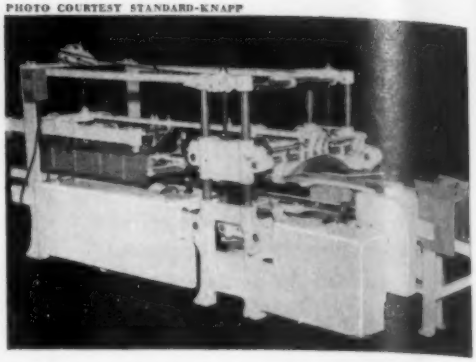
Automatic net weigher discharges predetermined net weights from 4 oz. to 6 lb. into either cartons or cans below.

PHOTO COURTESY J. L. FERGUSON CO.



Gallon cans can be packed, six at a time, into end-opening cases by loader at rate of 150 units a minute.

PHOTO COURTESY STANDARD-KNAPP



Hand-fed gluer and sealer is a compact integral unit with a single drive.

Case handlers and sealers

by KAYE HOLSTEBRO*

Preparing the completed primary package or container for shipment is the function of case-handling equipment, which includes case loaders and case gluers and sealers.

Case loaders receive the individual containers or intermediate packages, assemble them into a predetermined loading pattern and load them into the shipping case. Loaders may be classified by the type of container packed—bottles, cans, cartons, bags.

Bottle and can packers, adjustable to varying sizes of containers, guide the line of filled bottles or cans into balanced lanes, form the case-loading pattern with the load-forming grid and lower the containers into the waiting case by means of guide fingers. Cases may be delivered to the machines manually, semi-automatically or fully automatically. To minimize impact, the case is usually raised by a lift table, which may be cushioned as further insurance against damage to container or case.

Another safety device available prevents filled containers from being lowered unless an empty case is indexed in position to receive them.

Individual packers can be adjusted for loading a variety of case types, including fibre and corrugated shipping cases, full-depth wooden trays, half-depth wooden trays with partitions or carrier cartons.

Carton packers operate in much the same manner, except that the cartons are horizontally pushed into the case by means of pusher arms, which are synchronized with the load-forming operation. With this type of packer, the case can be placed either manually or automatically over the loading funnel. It may be removed, when filled, either manually or mechanically, for placement on an off-bearing conveyor to the shipping room or storage area.

Case gluers and sealers extend in application from hand-fed compression units—where the shipping-case flaps previously have been glued manually—through the semi-automatic and automatic types which combine gluing and sealing for continuous production. Some of these may incorporate stamping, coding or marking mechanisms as well.

Most types of gluers and sealers operate in the same general manner. Cases are received into the gluer, where the outer flaps of the case are mechanically opened and held in a horizontal plane. The top inner flaps are closed and glue is applied. The glued case is guided directly into the sealer and carried between the unit's top and bottom belts for the time required to insure bonding of the flaps and a completely sealed case.

An adaptation of the standard gluer and sealer is the "short" model. This compact unit, which both glues and seals manually fed cases, handles a wide range of sizes and will glue and seal top or bottom flaps or both.

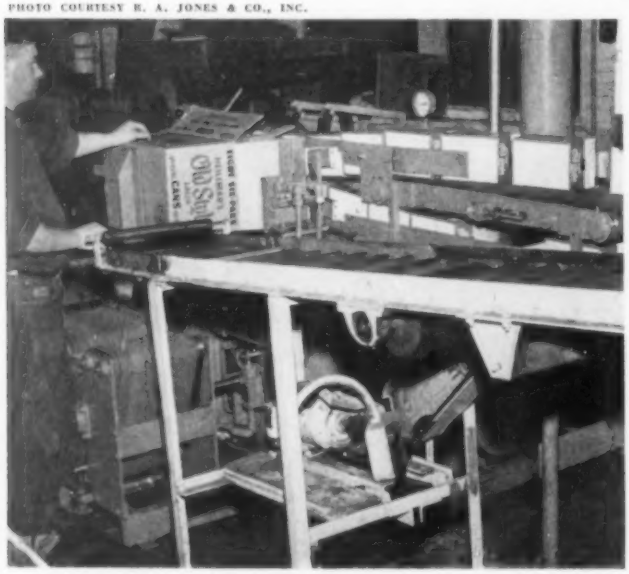
Most machines provide means for adjusting to different sizes of cases. Adjustments may be manual, push button or self-adjusting.

The multi-adjustable machine, sometimes called the "push-button" type, receives and seals a variety of case sizes within machine limits. Perhaps the most unusual aspect of this machine is that it is capable of handling the entire output of a plant and at the same time handles a range of sizes.

In operation, the machine is re-

*Chief Engineer, Standard-Knapp Div., Emhart Mfg. Co., Portland, Conn.

PHOTO COURTESY R. A. JONES & CO., INC.



Case loader on a high-speed, 600-cans-a-minute line for beer automatically packs four carry cartons into a shipping carton.

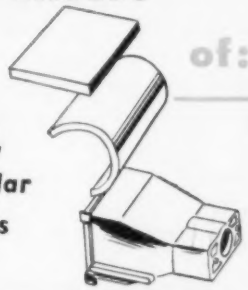
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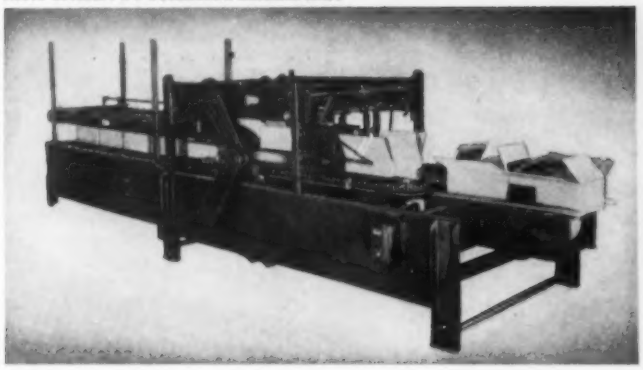


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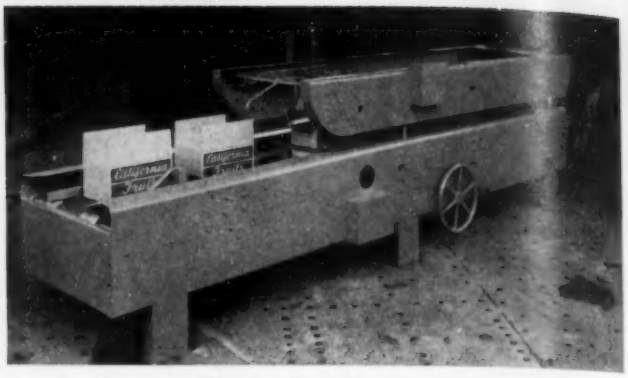
Markem Machine Co., Keene 11, New Hampshire

PHOTO COURTESY A-B-C PACKAGING MACHINE CORP.



Automatic unit seals, tops, bottoms of corrugated cases. Seals various sizes; speed to 2,400 per hour.

PHOTO COURTESY ELLIOTT MFG. CO.



Compact gluer-sealer adjusts easily for various-size shippers, installs readily. One motor powers unit.

motely controlled by an operator who has separate power adjustments for height and width. The principal conveyor into the machine is fed by a series of "spur" lines, each containing a different size of case. Theoretically, the number of spur lines that can be handled is without limit.

The operator has a series of indicators which show the height and width adjustment of each spur line. As one line is emptied, the operator pushes a button which adjusts the machine height for the next conveyor line to be fed into the main line. An indicator shows when the proper adjustment is made. The adjustment is repeated for width and then the gate, which normally cuts off the spur from the main line, is opened and the cases begin to flow into the machine.

Should a new case size be substituted for an existing size, it would only be necessary to change the indicator readings to fit the new size and establish it for one of the spur lines.

The push-button machine reflects the demand for greater automaticity and centralized packaging required by many high-speed industries.

Another adjustable type is the self-adjusting sealer. This machine receives cases at random, within a certain range of sizes, and automatically adjusts to the height and width of the package. Manufactured for both top and bottom gluing, these machines are highly versatile. Because it is necessary that one case clear the glue rolls before the next one can enter, the machine is slower than other types. The compression unit, however, is more flexible and does not have to be cleared before a new case can enter. The flexibility of the machine makes it ideal for use where case sizes in uncontrolled sequence, rather than volume, is the primary consideration.

One of the newest machines, which has already established a definite trend, is the combination machine. Designed to conserve floor space and give higher operating speeds, this unit consists of a case opener and positioner, packer, and side gluer and sealer all within a single machine. Although installations have been made, it is too early to report on user experience.

Many types of special gluers and sealers are available for unusual applications. However, because each machine is built to solve a specific problem, it is impossible to generalize on them. The sales engineering department of any reputable manufacturer of packaging machinery will be able to answer specific questions.

Carrier-carton handling

Although not properly classified under "case handlers," the tremendous strides made in loading beverage cans and bottles into carrier containers demand attention. Of major importance is the integration of carton inserters with case packers.

Carton inserters—which place cans into the familiar carrier carton—are available in two basic types: the high-speed cartoner for the closed-end type and cartoners for the open-view type.

One of the most popular types of high-speed carton inserters is designed to handle up to 1,000 cans per minute on either the six or 12 pack. This machine handles the standard 12-oz. flat-top can, but can be made adjustable to handle the 10- and 16-oz. flat-top cans. The unit automatically opens the carton, inserts the cans and seals the carton.

One type of inserter for the open-view pack, the so-called "open and wrap-around," forms a paperboard wrap around the cans and seals the carton underneath. Highly versatile, the machine can pack in four loading patterns: two by two, three in a row, four in a row and three by two. It can handle 8-, 10 and 12-oz. cans.

Another type, for the six-can, open-end, lock-tab carrier, loads at the rate of 750 cans per minute. This machine is adjustable for handling 12- and 16-oz. flat-top cans. Other can inserters operate at speeds ranging from 55 to 90 cartons per minute.

After the cartons are loaded, they can be automatically placed into corrugated shipping cases by a packer. The final step is the automatic gluing and sealing of the shipping case.

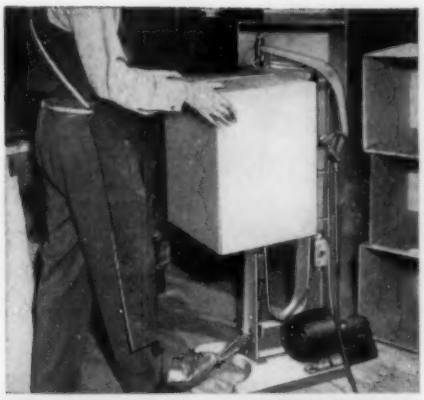
Bottled beverages are loaded into carrier cartons of the open type by bottle packers. The shipping case, with carrier cartons in place, is fed to the packer which arranges the bottles and then lowers them into the carton. In addition to loading cases with carrier cartons, bottle packers will also load full-depth and half-depth wooden trays with partitions.

Precision control over every phase of operation assures a full pack without damage to containers or cases. The running line of bottles is divided into balanced lanes and then grouped according to the pack. Load forming is regulated and controlled automatically by mechanical devices so that a full pack is always available.

Filled bottles are delivered to the packer in a standing position. They are then guided to the dividing mechanism which separates the production flow into the required balanced lanes for packing. These lanes are conveyed to the load-forming grid and pusher guides. The bottles are then lowered through the grid and fingered into the case which has been elevated to the packing position by a lift table. The filled cases and table are lowered and the case discharged.

Bottle packers for the open-style carrier vary in speed from 100 to 600 bottles per minute.

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- **BOSTITCH BOX BOTTOM STITCHERS AND STAPLERS** Seven different machines to fit your every need—whether it's occasional box bottoming or high-speed, continuous production. There's no storage problem—you make up containers as needed.

- **BOSTITCH TOP STITCHERS AND STAPLERS** can handle heavily loaded boxes in a variety of sizes. Work table adjusts to container height by manual or automatic control. Combination box and bottom or top and bottom models also available.

- **BOSTITCH AUTOCLENCH**—Just touch it to a corrugated container, press the lever and a strong steel stitch seals the spot securely. No need for a blade or anvil, the staple closes itself. Easy to operate. Easy to load. See it demonstrated.

- **BOSTITCH TACKERS AND STAPLING HAMMERS**—Make quick work of tagging, labeling, and lining wooden boxes. Two to four times as fast as hammer-and-tacks. Special Bostitch T5 staples tags on corrugated containers and clinches inside the board!

Write for free bulletin which shows how Bostitch shipping room tools can save time and money for you. Address your postcard or letter to: Bostitch, 733 Mechanic Street, Westerly, R. I.

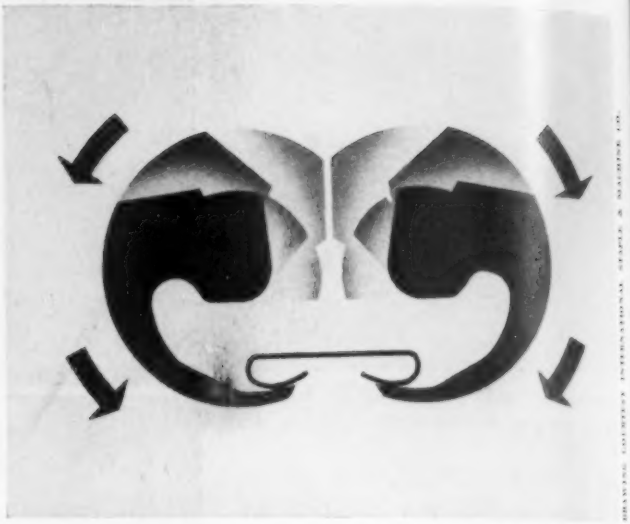
FASTEN IT BETTER AND FASTER WITH

BOSTITCH®
STAPLERS AND STAPLES



DRAWING COURTESY ACME STEEL CO.

Conveyor model stapler has twin heads (one of which is movable) for simultaneous closing of both ends or sides of full-overlap cartons at rates up to 400 per hour.



Process closing carton tops and bottoms from the outside after they have been filled utilizes retractable anvils for positioning and clinching metal staples.

Stapling and stitching equipment

by SHERMAN L. SMITH*

A small bent piece of wire is the answer to many of the packaging industry's fastening problems—in terms of speed, security and savings.

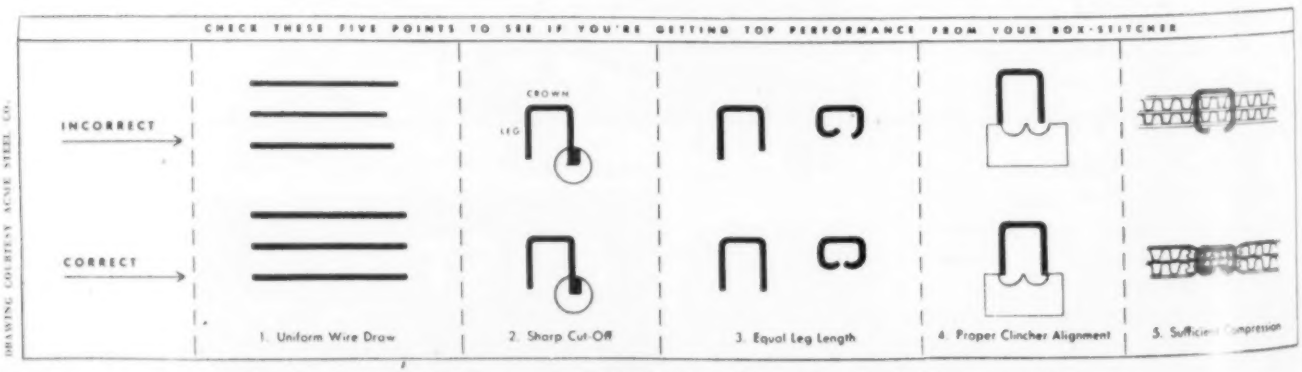
Paper and sometimes cloth bags, folded or with cardboard bag tops, are stapled with equipment ranging from the small desk-type stapler to the large power-driven wire stitchers. Foot-operated and motorized staplers are also used. Equipment is available for any production volume.

Stapling is rapidly becoming a preferred method for sealing certain types of larger-sized plastic bags, such as those used in packaging apples, oranges, etc. With one type of machine, the twisted neck of the bag is placed over an anvil. When the treadle is pressed, the staple is driven astride the bag and squeezed tightly together to make a firm seal that is virtually airtight. A hand tool is now available for pre-packagers and retailers who do pre-packaging or occasional repacking.

Small items of merchandise—jewelry, cosmetics, hardware, small tools, toys—are stapled to display cards to make a counter package that provides better display, description and directions, more sales appeal and makes pilferage more difficult. Attachments and other related items are often stapled to the same card to provide a complete unit of sale. Staples are available in many sizes and can be placed around the product—even glass items—to hold it snugly and safely.

One of the important applications of stapling is in manufacturing and sealing corrugated shipping containers. These containers have been developed to the point where many products formerly shipped in wooden crates and cases are now shipped more safely and economically in containers of corrugated paperboard. Electric motors, small vises, even television sets and refrigerators, are shipped in corrugated. One manufacturer of toilet bowls found that those shipped in corrugated containers survived a train

* Advertising Manager, Bostitch, Westerly, R. I.



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Check points of performance standards for efficient carton-stitching operations.

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Model 3011 to 5 lb.
Model 3021 to 20 lb.
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For rapid and accurate checkweighing or filling to predetermined weights. Choice of three Speedweigh models. Over-under indication. Shadow-free wide-angle reading . . . accurate to 1/64 of an ounce . . . exclusive "coined" bearings for greater accuracy, longer life . . . stainless steel beam . . . enclosed levers . . . choice of platters and scoops . . . easy to carry.

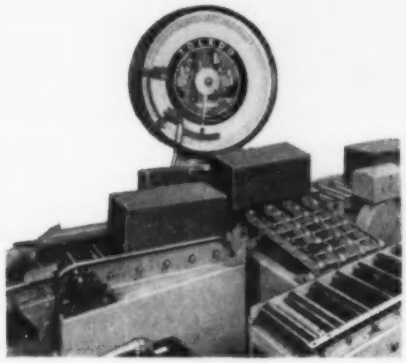
PRINTED WEIGHTS



Printed weight figures eliminate human errors, guard accuracy of vital weight records. Toledo Printweigh Scales available in a range of sizes and capacities. Prints on tickets or paper tape; multiple copies. Easy to operate.



FILLER WITH AUTOMATIC CUT-OFF provides for precision weighing of free flowing, granular materials. Available on Models 3021 or 3031 for accurate filling of containers.



CARTON CHECKER

Toledo Automatic Carton Check-Weighers detect shortages, overages or breakage by automatically checking each carton against standard weight; and rejecting those outside of tolerance.

PARCEL POST SCALES



Model 3659 shown here, completely automatic. Capacity 70 lb. Illuminated indication. Computes parcel post for all zones. Other Toledo postal scales include fan types with capacities to 40 lb. and Model 2041 Bench Scale with capacity of 75 lb. Charts with foreign rates available.

LABEL IMPRINTER

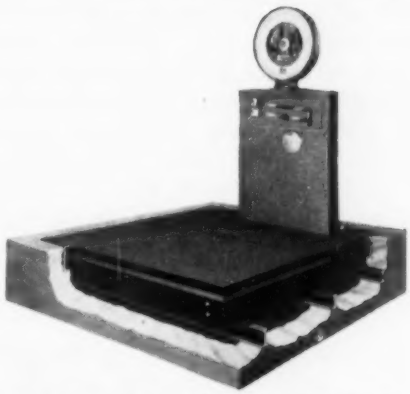


Serv-A-Label provides economical imprinting of roll labels for your specific needs. Imprinting plates easily inserted. Simplifies label inventory problems.

BAGGING AND FILLING

Accurate filling of heavier bags and containers is rapidly accomplished with Toledo Over-and-Under Dial Scales. Wide indicator travel provides close accuracy in trimming filled packages. Available in either portable floor or bench style scale.





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FLOOR SCALES have capacities to 6500 lbs. Choice of 5 platform sizes, 46″ x 38″ to 76″ x 54″.

PORTABLES are easily moved. Dial capacities range from 125 lb. to 2000 lb. Platforms are 24″ x 30″.

BENCH SCALES have dial capacities from 50 lb. to 250 lb. Platforms, 20″ x 20″. Available with wheeled stand.

TOLEDO SCALE COMPANY, 1097 Telegraph Rd., TOLEDO 1, OHIO

Toledo Scale Company of Canada, Ltd., Windsor, Ontario, Canada.

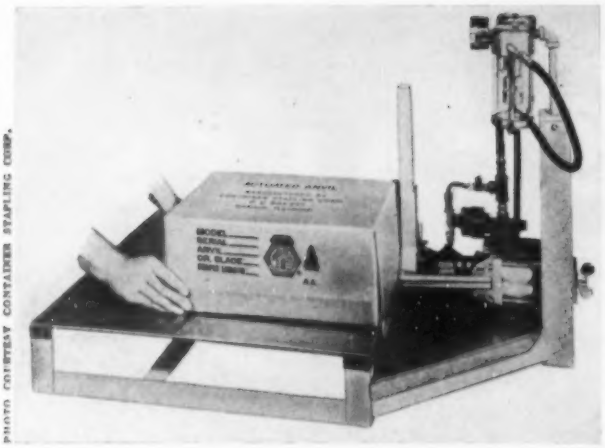


PHOTO COURTESY CONTAINER STAPLING CORP.

Completely mechanical automatic stapling machine clenches the staple and retracts when carton is tapped against the stapling head. Speed is reported at 200 cartons per minute.

wreck while those crated in wood were badly damaged.

Wire stitching is one of the preferred methods of forming the manufacturer's joint for corrugated and solid-fibre shipping containers. The wire stitch or staple passes completely through two thicknesses of board.

When containers (shipped in the flat) are needed for packing, they are quickly shaped by hand, the bottom flaps are folded over and staples are driven through the overlapped flaps by a machine equipped with a bottoming post, which clinches the staples inside the box. A comparatively inexpensive machine for this purpose is the foot- or motor-operated bottom stapler, which uses pre-formed staples in strips. For faster work and greater production, motor-driven bottom stitchers are used which make their own staples from a coil of wire. The initial investment in a stitcher is greater than the cost of a stapler, but the coiled wire is economical where output of containers is large.

The stapling operation takes only a few seconds and the container is then ready for packing. It is not necessary to put weights inside until an adhesive has set and the container can be picked up and moved about during packing without danger that the contents will fall out.

After the container is packed, the top flaps can be stapled too, thus making it completely secure. This used to be a rather complicated operation. A sealing blade was inserted under the flaps, requiring a definite pattern and sequence of staples so that the blade could be withdrawn after the last staple was driven. Machines are now available which drive and close the staple entirely from outside the carton. These may be had in hand-operated, air- or motor-driven types.

The hand-operated machines are especially suited to layouts where it is desirable to staple the cartons in various locations in the plant or in the shipping department. When access to an air line permits an air-driven machine to be used, operator fatigue is virtually eliminated and greater speed usually results, although hand operators have fastened 144 cartons in 22 min., with 20 staples in each.

Motorized machines are usually employed in conjunction with a conveyor line, which delivers the containers to the work table of the machine at proper height.

An important factor in selecting a machine for top sealing is uniformity of carton sizes. Obviously, portable machines can be lifted from one carton to another regardless of size, but, when a motorized machine is used, it is desirable that cartons be sealed in runs of uniform height to avoid frequent adjustments of the distance between work table and stapling head.

A hand stapler is available equipped with a pointed blade which can be thrust through the edge of the container to drive the staple through the overlapped flaps a few inches in from the edge. This leaves only a small slit at the point of entry and is used to seal small cartons.

When both the tops and the bottoms of shipping containers are stapled, they become almost completely pilferproof. It is virtually impossible to remove the staples and reseal the containers without leaving tell-tale evidence of tampering.

Stapling hammers and tackers are indispensable today in most shipping departments for lining wooden cases, installing protective pads in crates and attaching tags and labels. A new type of tacker, which throws the legs of the staple outward, is proving useful for attaching labels to corrugated containers. Operating from outside the carton, it clinches the staple inside the board without penetrating it all the way.

Stapling has also broadened the usefulness of flexible corrugated wrappings. It makes a rapid, secure fastening on any shape package and solves the problem of sealing odd-shaped packages.

So many types of stapling and wire-stitching machines are available that it is a good idea to consult the representative of a reputable manufacturer before deciding what will best meet your requirements. Not only the ability of the machine to do the job, but the location of the work, the volume of production and the amount of the investment that the work justifies are all factors to be considered in determining what equipment is best.



PHOTO COURTESY BOSTITCH

Motorized stapler secures bottom flaps of cartons easily, quickly and securely.

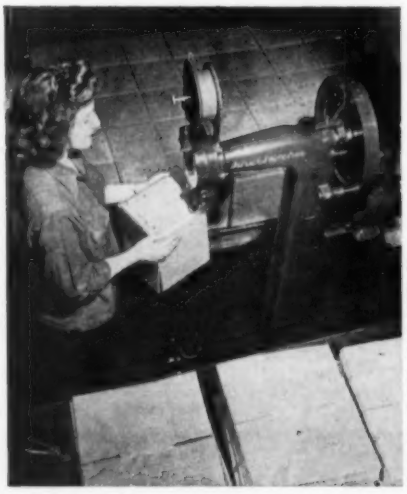
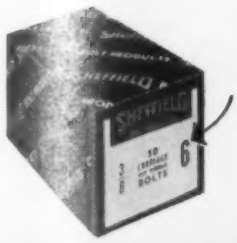


PHOTO COURTESY ACME STEEL CO.

Stapler-stitcher is geared for easy, rapid set-up of unfilled shipping cases.





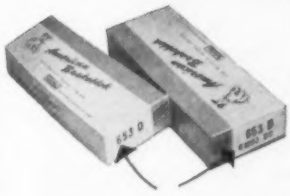




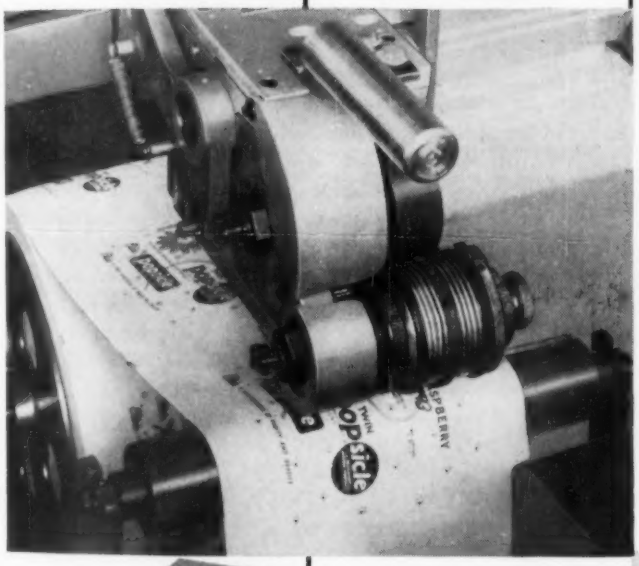
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Gottscho imprinters are made for applying everything from a code-date to a complete "label" on the top, side or bottom of jars, bottles, cans, canisters, folding cartons, set-up boxes, cases and crates. No matter whether your package is small or large... whether it has a flush, recessed or concave surface... whether it's a simple cube or an odd novelty shape... whether it's of glass, metal, film or paperboard — Gottscho has a machine to do the job.

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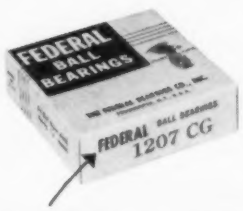
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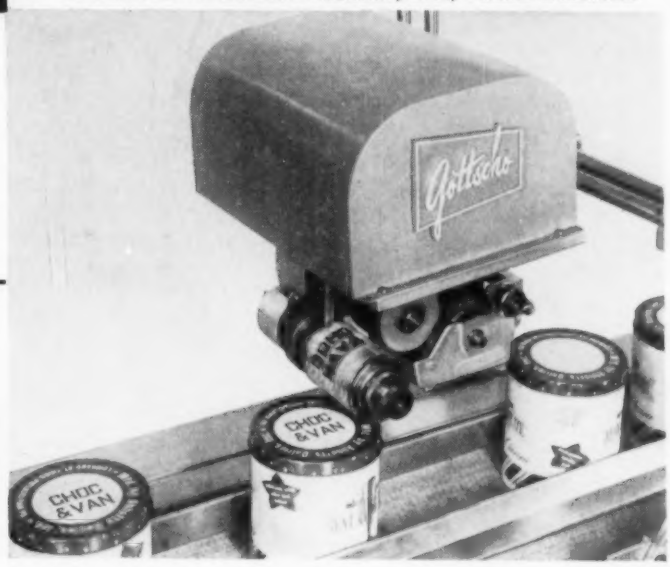
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Equipment for applying tape

General improvement has been made over the years in both the light- and heavy-duty types of dispensers. Lighter materials, without sacrifice of strength, have been adopted. Electrically driven dispensers are being used to some extent, but this type of equipment is limited to operations which are continuous and heavy.

Moistening features. The safety of a gummed-tape seal depends upon the permanency of the grip or bond between the kraft sealing tape and the container surface. Therefore:

1. The glue must be of sufficiently good grade and suitable for the intended use.

2. By the addition of moisture, the glue must be conditioned to the proper consistency for quick, deep penetration into the dry, porous box surface, where it hardens to form minute hooks anchoring the tape permanently to the kraft liner. If too little water is added, it does not penetrate the glue and the resulting weak seal breaks open in a few hours. However, too much water slows up application, as the tape slides out of place and requires longer rubbing to set. When the excess water dries out, the glue solution left is of insufficient strength to stick firmly.

Failure of gummed tape on shipping containers more often results from faulty application than from defects in the tape. An advantage of automatic equipment is that practically all elements of chance are eliminated in moistening the gummed tape to the proper degree.

To meet special conditions in cold shipping or refrigerating rooms, electric heating units were devised to keep the water in moistening tanks at proper temperature.

Measuring features. Less essential than the moistening features but still an important advantage of many modern machines is their tape-measuring function. Visible measuring gauges and set stops for standard lengths are two devices used.

Equipment for the small package is now widespread. The small package includes boxes, paper bags and ordinary wrapping paper, particularly for packaging retail merchandise which must be wrapped securely.

Pressure-sensitive tape dispensers. Unlike gummed-tape dispensers, machines for use with the newer pressure-sensitive or tacky tapes are required merely to measure, dispense and in some cases automatically cut predetermined lengths of tape.

But development of efficient dispensing machines was even more essential for pressure-sensitive tape than for gummed tape. Water-resistant cellulose tapes cost roughly 28 times as much as the 60-lb. kraft used for gummed tape. For this reason the most important part of a dispensing machine for tacky tape is its measuring feature. Proper dispensing of the short lengths can halve consumption.

The varied uses of pressure-sensitive tape have determined the different kinds of dispensing machines necessary for its efficient and economical application. Some are designed for factory production and may be set for predetermined lengths ranging from ¾ to 1½ in. Others are designed for use in retail stores.

Careful studies were made of the motions required for proper application of short lengths of tacky tape and the newer dispensing machines have been designed accordingly to aid efficient application.

A new semi-automatic machine for applying standard pressure (masking) tape to drums, canisters, cartons, roll goods, etc., is now available. Packages up to 17 in. in diameter are placed between adjustable spring clamps. One complete hand revolution of a swivel arm feeds the tape evenly and neatly to the package and the tape is then severed from the roll by a blade. The swivel arm, mounted in an oilless bearing, is available in any height up to 28 in.

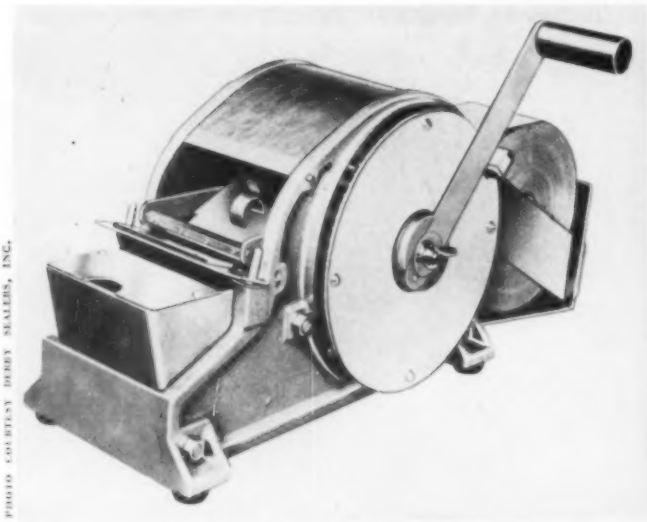


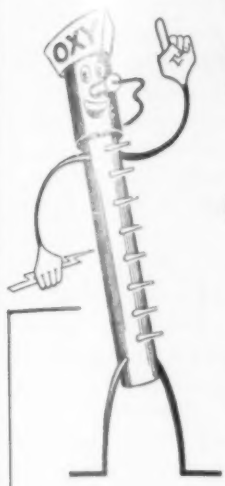
PHOTO COURTESY DERBY SEALERS, INC.

Rugged dispenser for sealing controls moistening, length and cutoff of 1- to 3-in. gummed kraft tape.



Two-in-one packaging of cans for deals or samples promotions is expedited by machine that applies creased tape.

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Auxiliary devices

One does not have to search far for a clear-cut answer to why accessory devices and equipment are a *must* in today's fast-paced, high-efficiency packaging operations.

Avoidable down time and deviation from uniform quality are both prohibitively costly. Accessory equipment is quite properly regarded as one of the best means of assuring uninterrupted operation and plus performance of package-line equipment.

For example, an aerosol packager has figured that every minute of down time on his line costs $70. A spare relay vital to the control and operation of the line has been installed to take over immediately if the operating relay goes out of action—otherwise many minutes of down time might be lost. A packager of a coated-gum-type laxative maintains constant humidity control in his packaging room so that the coated-gum tablets won't become sticky and jam high-speed counting and cartoning equipment. Other packagers pre-heat packaging materials to assure better absorption of the sealing adhesive, or they employ refrigerating devices to speed seal set.

These are but a few of the examples that might be enumerated, for the types of accessory equipment available (and the practical applications to which they can be put) cover a wide range extending from standard equipment to custom-built devices and including gadget-type units that the packager may devise for use in his own plant.

This discussion is limited mainly to commercial types of equipment that have standard applications in packaging operations.

Registration controls

In converting printed packaging materials such as paper, glassine, cellophane and foils into individual sheets for wrapping, packaging and bag making, a means must be employed to insure that each sheet is punched, perforated or cut off in correct relationship to the printed design on the web. Where a printed mark is not available it is often possible to use the leading edge of the web to interrupt the beam.

There are two types of photo-electric controls in general use.

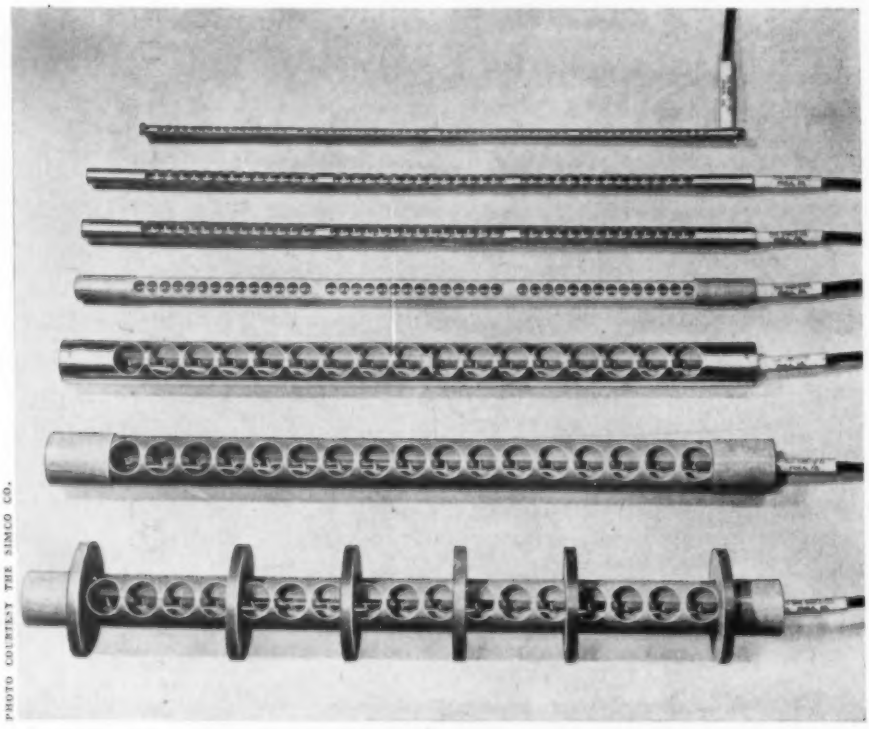


PHOTO COURTESY THE SIMCO CO.

Metal-encased static bars range in diameter from 5/16 to 1 1/4 in., from 1 in. to 12 ft. long, thus meeting requirements where the installation space is tight.

1. *One-way cutoff register control* is used where the accumulation of error in register is always in one direction. Hence, the control is required to correct in only one direction, the web being consistently overfed or consistently underfed with respect to the cutter. By employing a photo-electric scanner to "observe" register marks on the web and a selector switch actuated by the cutter to indicate cutter position, misregister between the web and the cutter can be detected and correction made.

With this arrangement, the control can be used to correct the register for each cut, or to allow a slight accumulation of error in cut length before correcting register. Correction is usually made by a solenoid or motor which actuates a mechanical correction linkage built into the machine.

One-way cutoff is applicable where web speed does not exceed 300 fpm. Moreover it is designed to correct fixed errors only, while the two-way takes care of erratic errors.

2. *Two-way cutoff register control* is applied where errors in register can be in either direction—that is, the web may be either retarded or advanced with respect to the cutter. Two-way cutoff register control will correct for either of the two conditions of misregister.

When two-way register is employed, the machine is set up so that the web is fed at the correct rate with respect to the cutter. A photo-electric scanner "observes" register marks or printed patterns on the web and produces signals which indicate the web position. A rotary photo-electric selector switch is geared to the cutter and produces signals which indicate the position of the cutter.

These two signals are fed to the control panel, which compares them to determine the amount and direction of any required correction. If a correction is necessary, the panel operates a correction motor which rotates in the direction necessary to register, or synchronize, the web and cutter with respect to each other. This correction is usually made through a differential gear connecting the machine-feed mechanism and correction motor. Two-way cutoff register con-

trol can handle web speeds up to 1,500 fpm and cycles as high as 2,000 per minute.

Photo-electric registration control has had to adapt itself within commercial limits for production with materials such as polyethylene that have presented new problems.

The best results in the controlling of pre-printed polyethylene webs have been obtained with the use of two-way correction. It is a material that is prone to stretch—more so than other converter's materials. Unwind and rewind at the printing source, forming, perforating and operations in general affect the tension on the material.

The tension of unwind and rewind at the printing operation, therefore, influences the problems that will be encountered at the converting stage. Any errors carried over into the repeats at printing will have to be corrected along with the additional errors accumulated at the converting operation itself.

Generally speaking, registration control has been spoken of as either one way or two way where set increment or proportional corrections have been the methods of maintaining proper registration through use of solenoid or motor acting on a mechanical linkage built into the machine.

Humidity controls

The problem of humidity and moisture control is of prime importance to the user of pulp and paper products, but it is also important for any packaging material or product to be packaged where performance is critically affected by moisture or dryness.

The types of equipment available include devices which indicate changes in relative humidity or which measure the actual moisture in a product. In addition, constant-humidity-control systems as well as simple individual humidifiers are offered to meet a whole range of needs.

Static eliminators

Disrupted production schedules in packaging can often be attributed to static electricity, particularly where plastic films are being used, such as acetate, polyethylene, saran, Pliofilm or vinyl. Trouble is less often encountered with cellophane or paper, but even these materials can present severe problems. Most packaging difficulties due to static occur when the materials are being processed in the packaging machinery or in allied converting machinery. Here it is a question of neutralizing the charged materials in order to assure a correct and even movement of material through the machine.

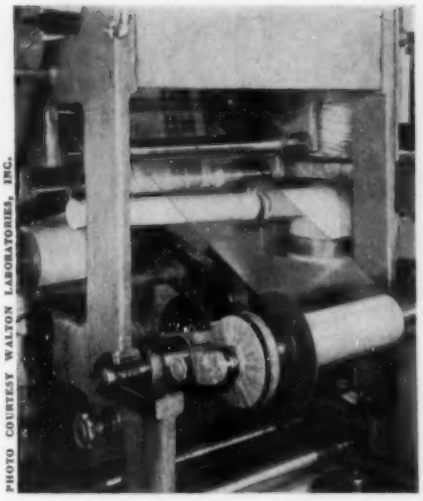


PHOTO COURTESY WALTON LABORATORIES, INC.

Specially designed humidification unit on a printing press helps maintain proper moisture in cellophane.

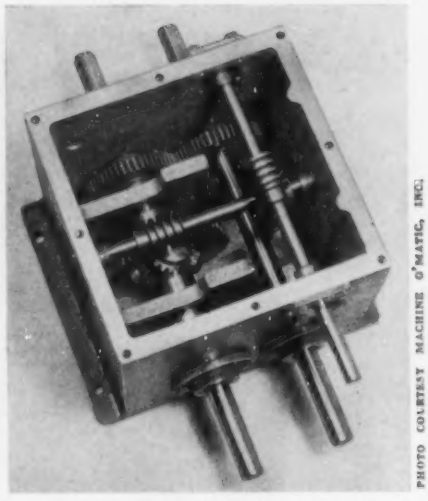


PHOTO COURTESY MACHINE O'MATIC, INC.

Typical mechanical correction transmission unit. Unit is used with electronic system that detects errors.

Another static problem involves the product being packaged. Problems with powdered products are often particularly acute and unfortunately often very difficult to solve.

Machinery types, on which static eliminators have frequently been needed and on which many successful installations have been made, include: (a) bag-making machinery, (b) envelope machines, (c) window-carton and window-envelope machines, (d) slitters, sheet cutters and other converting machinery, (e) printing and duplicating machinery, (f) overwrapping machines and (g) package-filling machinery and combination package-forming and filling machinery.

The principal types of static eliminators include:

Simple grounding devices. These are the oldest and least expensive form of static eliminators and consist of suitably grounded metallic bristles or points which are applied either very near or touching the material to be discharged. Wire-core tinsel is sometimes used as well as radial brushes of various descriptions. More elaborate and somewhat more efficient devices consist of properly spaced flexible replaceable points in a protective mounting.

Contrary to popular belief, these grounding bars operate best when the voltage on the material to be discharged is extremely high, because the voltage between the charged material and the grounded points initiates the ionization of the air and thus facilitates neutralization.

The main disadvantage of such devices is that they will not do a complete job of neutralization, since there is a threshold voltage below which ionization does not occur. Thus, where control of the material is the important factor, as in many paper, printing, textile and plastic-film applications, the grounding static bars will not reduce the charge to a sufficiently low value. However, they are very useful for transmission belts and other applications where no materials control is involved. They would also be useful, where a static-induced fire hazard exists, to reduce the amount of static present to a point that would be safely below any value sufficient to produce sparks.

Electric static eliminators. Among devices for static elimination, this type of apparatus is certainly the most effective and widely used today. It consists of one or more static bars, determined by the specific application, and a power unit which energizes the bars with a high voltage of very low amperage. The static bars can assume a variety of forms, usually having linearly displaced bristles or points. They are mounted on the machine so that the material to be discharged passes at the distance specified by the manufacturer.

The main advantage of this type of eliminator is that it can produce ionization of the air independently of the material to be discharged. It can produce sufficient ionization to do an essentially complete job of neutraliza-



PHOTO COURTESY GENERAL ELECTRIC CO.

One-way cutoff register control is used for applications where accumulation of register is always in one direction of web.

tion on almost any material and at highest production speeds.

Although all are perfectly safe, the most efficient static eliminators of the electric type sometimes cause an involuntary recoil when the points of the bar are touched. If this is objectionable and the operator must work where he will touch the points, the power unit can be connected to go on and off automatically with the machine. So-called "shockless" types are available for less severe cases.

The electric static bars can usually be made in any length desired. Cross-sectional shape and size vary among manufacturers from several inches in diameter down to 5/16 in. Some manufacturers provide only one large diameter, while others offer a complete line of sizes so that static bars may be used even in inaccessible or narrow places. Some manufacturers, moreover, will devise special static bars to meet unusual conditions.

Range of operation (maximum distance between bar and material for good elimination) varies with the efficiency of the particular eliminator, the quantity of charge on the material and the speed of the material. Generally speaking, the manufacturer's instructions should be followed.

The main disadvantage of the electric eliminator is lack of Underwriters' approval in explosive atmospheres. Underwriters' Laboratories will not approve any equipment in such locations which has exposed electric parts (such as the points of the bar). Nevertheless, in hazardous locations, where better static elimination is needed than can be provided by grounding devices, an electric eliminator can often be safely used.

Radioactive static eliminators. Radioactive elements, such as radium or polonium, plated on a metal rod or plate, produce alpha rays which ionize the air and thus neutralize charged materials.

One of the main advantages of this type of eliminator is that no electric connections are required and it can be installed very easily. In addition, since there are no electric parts, it can be considered absolutely safe for use in an explosive atmosphere from the standpoint of introducing no additional fire hazard.

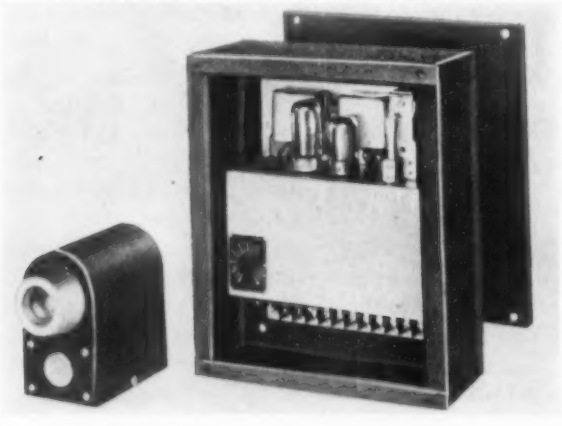
The main disadvantage is its fairly low efficiency. Although entirely adequate for many operations, the radioactive elements cannot be used in sufficient quantities to give adequate results when the quantities of charge on the material are very high or when the material must travel at high speeds. Plastic films running at high speeds are often in this category. In addition, the health of employees must be protected by following installation and operating instructions carefully. Lint, dirt, ink, etc., accumulating on the active surface, reduce efficiency drastically and the bars must be kept clean.

Chemical compounds can be effectively used to control static in certain operations. Printing establishments, plastic-sheet processors and textile manufacturers, for example, use this method. Results are said to be excellent where stencils for silk-screen printing have been sprayed with a liquid anti-static dressing. Limitations of the method may include the extra step of application and the cost of the chemical where substantial areas require treatment.

Humidification is a time-honored means of eliminating static and is particularly useful for certain grades of cellophane, paper and other materials which will absorb moisture readily. It is not moisture in the air which eliminates the static, since humidified air remains a good insulator; actually it is moisture absorbed into or deposited on the surface of the material to be discharged which gives the desired result. The material then becomes slightly conductive so that static charges flow through it to any grounded part of the machine with which it comes in contact.

A disadvantage of humidification is that time must be allowed for the material to absorb moisture. Rolls of material will absorb moisture very slowly, particularly the inside layers if they are tightly wound. Pre-conditioning in humidified storerooms may, therefore, be more effective than humidification in the workroom. Another disadvantage is that so many of the modern packaging materials are virtually non-

PHOTO COURTESY PHOTOSWITCH DIV., ELECTRONICS CORP. OF AMERICA



This registration control designed to operate continuously in both high- and low-speed ranges. Compact unit is prefocused. Various model scanners are available.

BOX and STITCH the INLAND WAY for "PLUS" PRODUCTION

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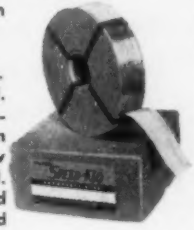


MODEL M1—Bottom Stitcher

FEATURES

- Instant speed regulator
- 150 to 400 staples per minute
- Hardened steel feed wheels
- Finger-tip control
- Reversible parts —minimum replacement and upkeep

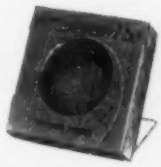
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- Wire trouble eliminated.

Superior quality wire provides uniform feed from spool and smooth flow through stitching head. Coppered or galvanized comes in 50, 25, 10 and 5 lb. coils.

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In a new protective carton which doubles as wire dispenser!

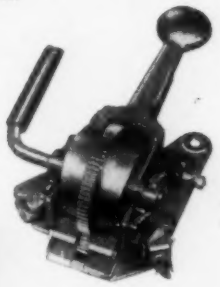
- Wire feeds directly from carton—smoothly, trouble free.
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MODEL "D"
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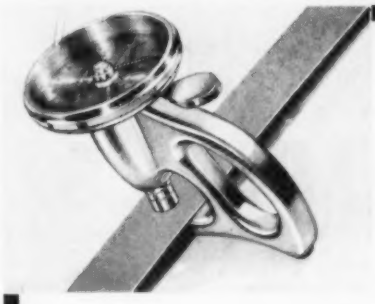
going crazy with



no need to, once you discover the SIMCO "Midget" Static Eliminator!

Why cut out paper dolls when you can cut out static much more easily? The SIMCO "*Midget*" Static Eliminator is *guaranteed* to be the most effective, yet least expensive means available . . . for *all* packaging machinery, including cutting, slitting, bagmaking, wrapping, and filling machines! It is also adaptable to all types of materials, including paper and synthetic films. Write today for full information about your problem.

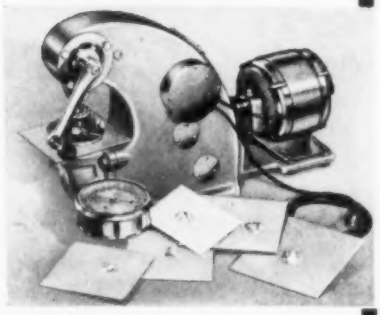
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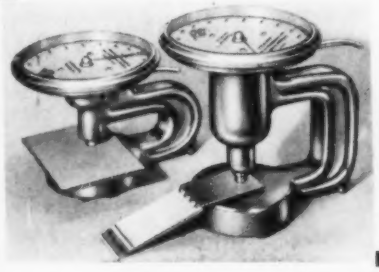


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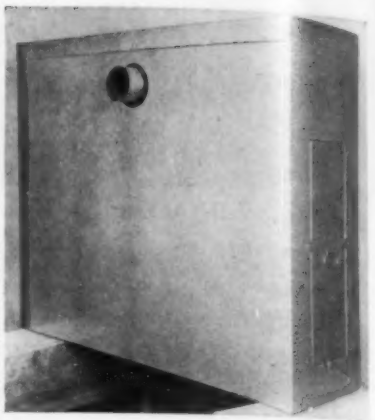


PHOTO COURTESY AVISCO

High-speed cellophane conditioner replaces moisture loss. Unit can be attached to any printing press.

hygroscopic and enough humidity must be present to permit the deposition of a slight film of moisture on the surface of the material. The high humidity also produces an extremely uncomfortable working environment.

Special devices

A multitude of inspection and control devices speed today's automatic packaging, maintaining constant levels in filling hoppers or accurately positioning containers or components; scanning labels; picking off loose caps; triggering special warning systems–for it is axiomatic that, when speeds are increased, problems of regulation and inspection mount.

For example, Danforth Wines, Ltd., improvised for its fully mechanized filling and capping lines a supersensitive, relatively simple automatic inspector. The device, consisting principally of a microswitch, solenoid valve and pneumatic cylinder, is sensitive to 25 thousandths of an inch. It detects double liners, loose caps and cross-threaded caps. Another company employs an electronic device for picking off loose caps on F-style cans.

Jigs for setting controls on filling or other equipment have been found valuable on the high-speed, fully mechanized line, since faster speeds and more exacting requirements make it necessary to reinforce human judgment with precision aids.

One packager reportedly has developed a successful device for removing moisture from jars which consists of an endless belt faced with wet-strength kraft paper. In fact, examples of the benefits derived from home-engineered devices are to be found in nearly every plant where plus performance is demanded.

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reprints

to work!

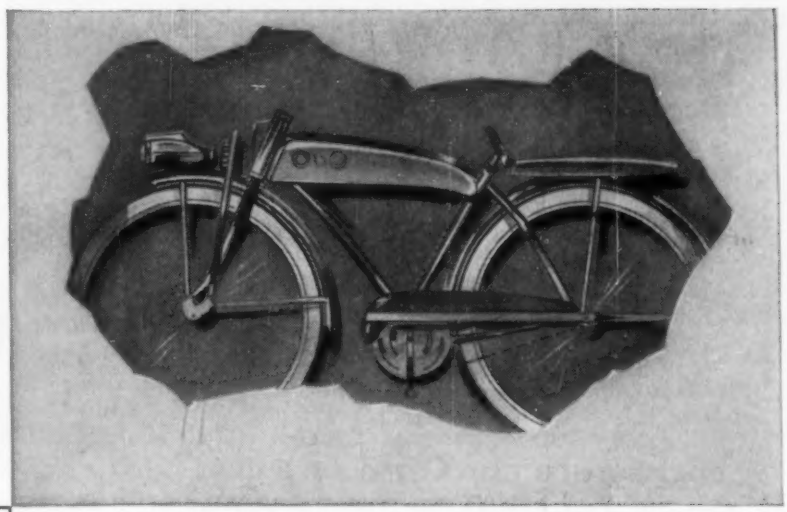
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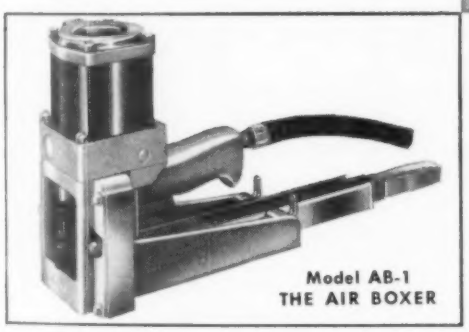
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staple your cartons from the outside after they're filled

with International Staplers





Model AB-1
THE AIR BOXER

It's lighter . . . it's faster . . . it costs less! International's AIR BOXER is ideal for fast efficient closure of all corrugated or fibre board cartons after they have been filled. Revolutionary new 2-cycle motor drives and retracts through the entire stapling cycle—permits a lighter weight, highly efficient stapler. Only 8 lbs. 12 oz.—is easier to handle, reduces fatigue, increases carton closing speed.

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International Staplers are ideal for hundreds of difficult carton closing applications. Whether you pack bicycles or beds, kitchen cabinets or beauty creams, aluminum windows or coils of heavy wire, there's an International Stapler to fit your needs.

They are easy to install and are easily adapted for different packaging operations. Conforms to Rule 41 requirements; they operate quickly and efficiently, don't tire the worker, and staples hold securely, even when shipped around the world.

Maintenance costs are low, and they do the job when all other methods such as glue and tapes fail.

Remember, International Staplers can close tops and bottoms of cartons simultaneously—after the cartons are filled. Standard units will close up to a thousand cartons per hour. There is a model to fit your exact packaging needs. Contact your nearest International dealer or write for details on how to solve your packaging problems, reduce your packaging costs.

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SECTION 13

In-plant package fabrication

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Package-making equipment

Under certain circumstances, usually where volume is large or where container requirements are specialized, the packager may find it practical to install his own in-plant machinery for fabricating containers.[1]

The types of equipment available include machines that form or make:

1. Folding boxes
2. Set-up (rigid paperboard) boxes
3. Corrugated shipping containers
4. Metal cans
5. Fibre cans
6. Metal-edge boxes
7. Paper bottles
8. Rigid transparent containers
9. Partitions.

Accessory equipment that may be required includes machinery for forming liners, cutters, scorers and devices for box doming, window applying, stapling, stitching, tape applying, gluing, spout inserting and the like.

Closely allied to the machinery models that fabricate the package are several important types of equipment that automatically set up a pre-formed container. The advantages include the elimination of manual operations, flexibility and closer inventory control.

In some operations, such as the packaging of cigarettes, where volume is high and continuous, various units, such as carton-making equipment and printing units, may be integrated so

[1] See also, "Bag-Making Equipment," p. 522, and "Pouch Formers, Fillers, Sealers," p. 470.

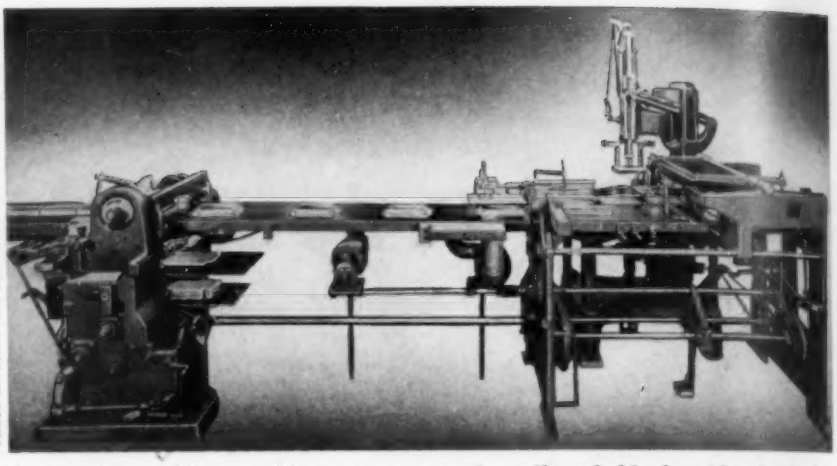


PHOTO COURTESY NEW JERSEY MACHINE CORP.

Automatic machine combines corner-stayed cardboard blank with glued-off paper wrap and automatic feeding of conventional box-wrapping machine.

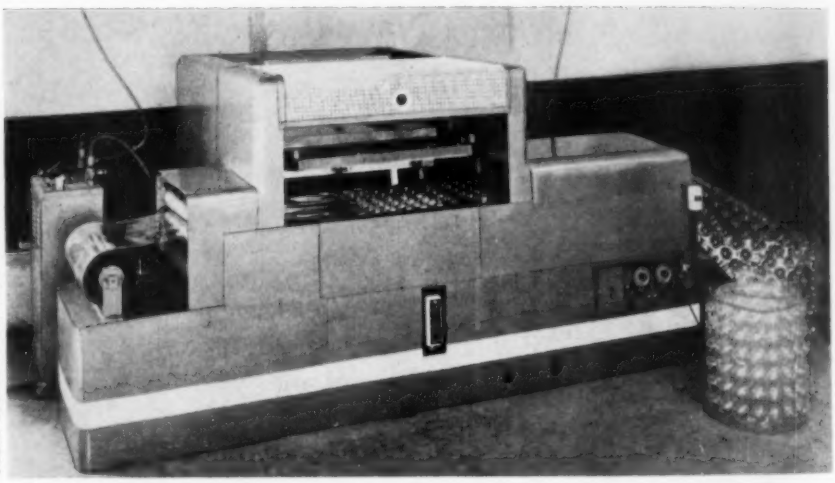


PHOTO COURTESY AUTO-VAC CO.

Automatic roll-feed vacuum-forming unit for high-speed forming of transparent packaging can produce small parts at 50,000 per hour.

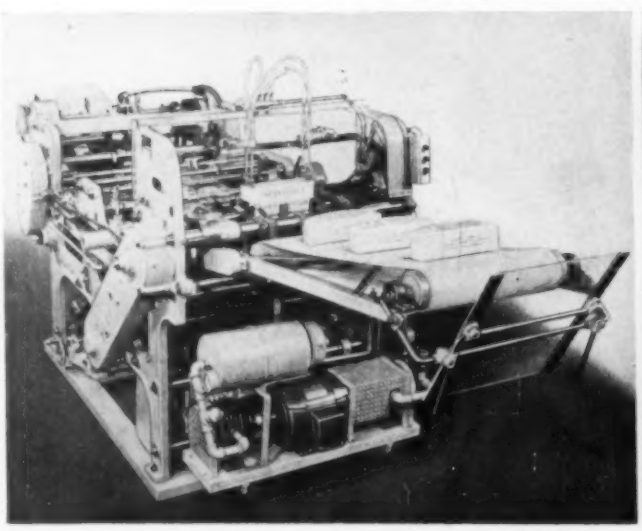
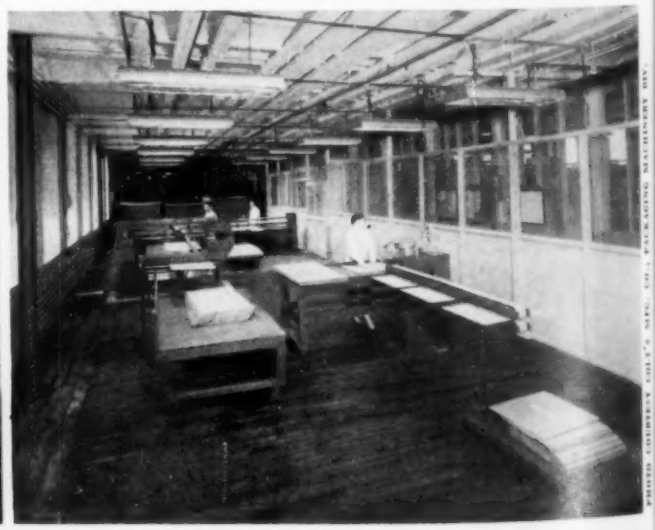


PHOTO COURTESY THE INTERNATIONAL PAPER BOX MACHINE CO.

Box-forming machine speeds cigarette-carton production with high rate of 7,500 cartons per hour.



Corrugated-box-making department includes a box machine with imprinter, slitter-scorer and tape setter.

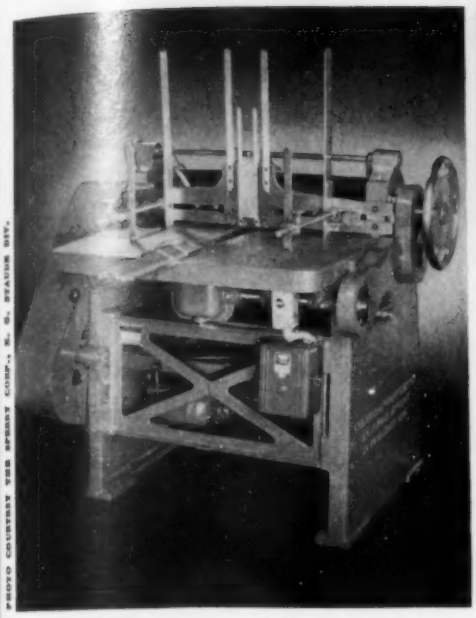


PHOTO COURTESY THE SPERRY CORP., E. G. STAUDE DIV.

Partition-slotting and slitting machine handles chipboard and corrugated stock at speeds up to 11,000 units per hour.

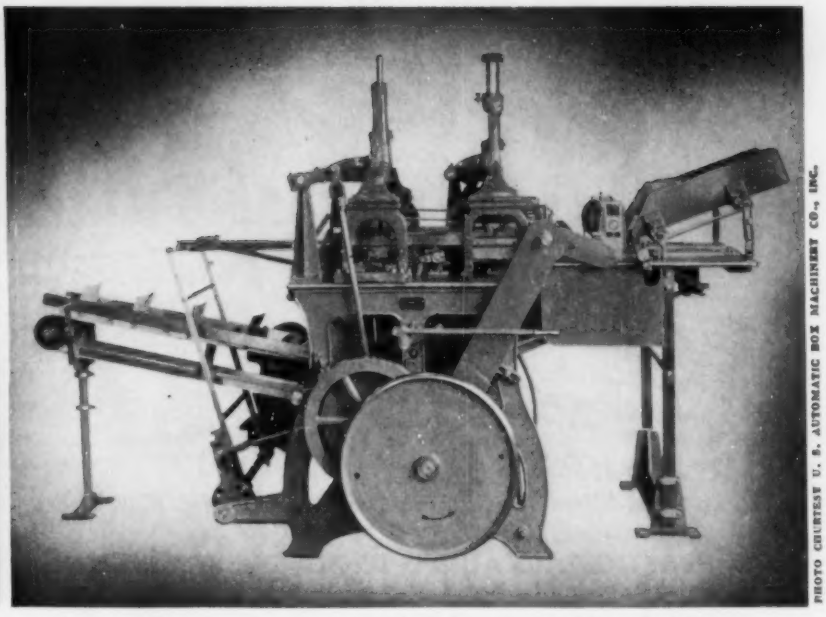


PHOTO COURTESY U. S. AUTOMATIC BOX MACHINERY CO., INC.

Box machine produces one-piece hinge-cover ("Brightwood") boxes with glued corner and cover, forming and gluing simultaneously. Speeds range up to 55 per minute. This machine is adjustable for various sizes.

Machine for beading sheet plastics. Machine shown here may be teamed up with a fabricating machine, not illustrated, which makes cylinders up to 10 in. long in diameters 2½ to 8½ in. at speeds ranging up to 500 per hour.

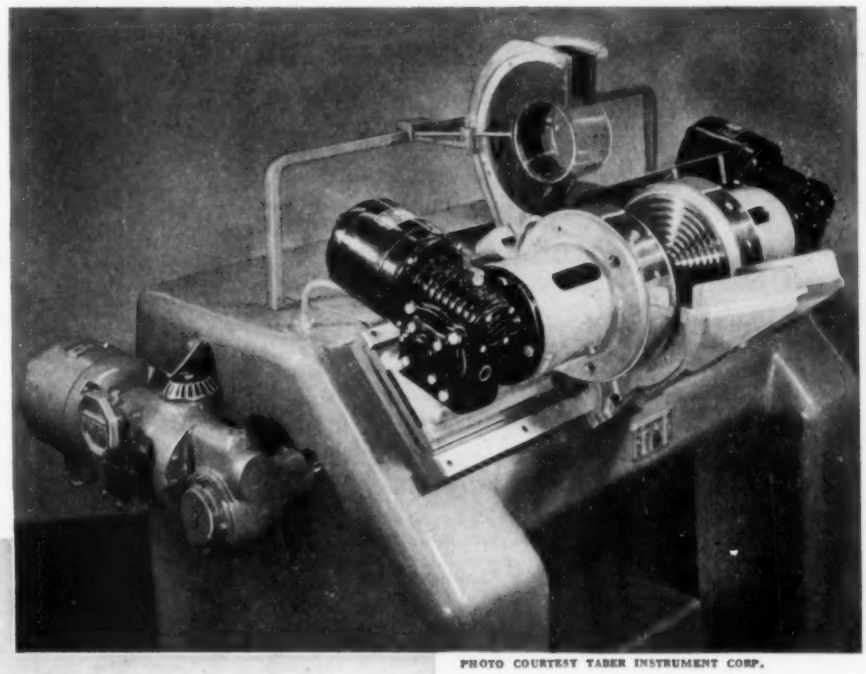
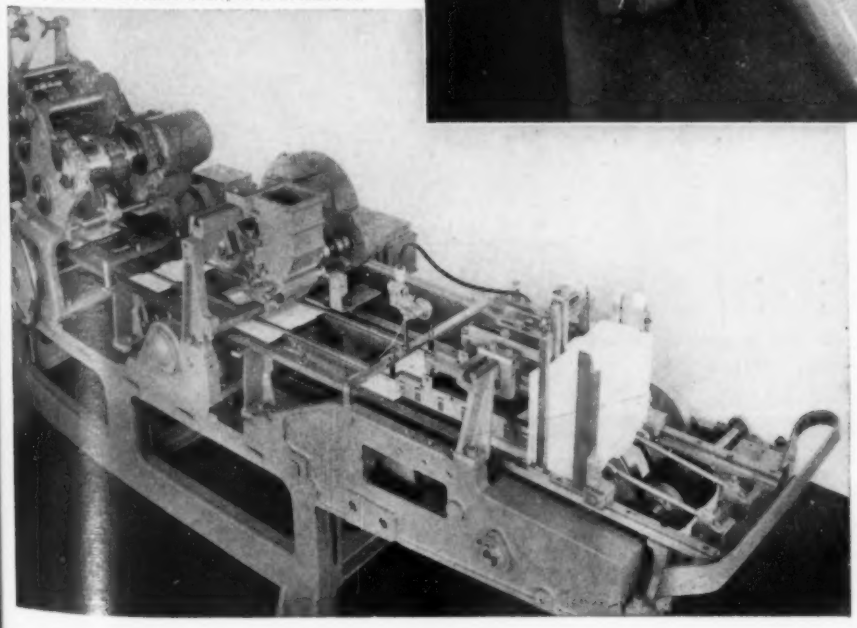


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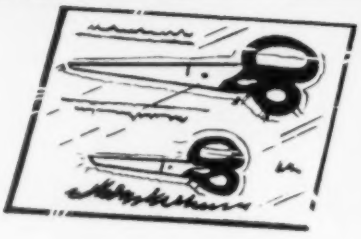
Left: Package-making machine cuts and creases spout from web, gluing it to carton. Carton blank is glued and folded flat. Speeds up to 24,000 per hour. Handles milk containers from half-pint to half-gallon sizes.

Comet

PLASTIC PACKAGING MACHINES



Transparent Blister Packaging



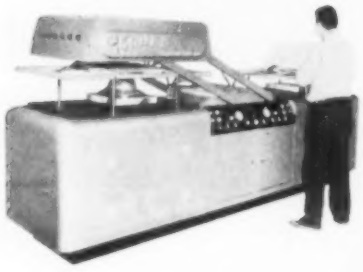
Transparent Skin Packaging

PLASTIC PACKAGING PRODUCES PRE-SELLING PROTECTION—CREATES CONSUMER CONSUMPTION

• HIGH QUALITY PACKAGING
• LOW PRODUCTION COSTS

ASSURED BY

1. **COMPLETE AUTOMATION**—all operations controlled remotely at control panel—manual or optional automatic feed and ejection of formed part.
2. **TWIN TABLE PRODUCTION**—efficient and fast.
3. **INDEPENDENT CONTROLS FOR EACH TABLE**—each table can be operated independently of the other, different, simultaneous packaging operations.
4. **TIMING MECHANISM**—adjustable timing for each step with reserve capacity for additional or secondary operations.
5. **HEATERS**—specifically engineered for material being processed resulting in maximum speed and efficiency.



STANDARD MODELS

MODEL	MOLD AREA MAXIMUM	SHEET SIZE MAXIMUM	FLOOR SPACE WIDTH—LENGTH
PEX-2436	24″ x 36″	28″ x 40″	34″ x 118″
PEX-3648	36″ x 48″	40″ x 52″	58″ x 118″
PEX-3672	36″ x 72″	40″ x 76″	82″ x 118″
PEX-4872	48″ x 72″	52″ x 76″	82″ x 154″

Many sizes, plus custom-built machines available.

ENGINEERING ASSISTANCE—we will be pleased to discuss your vacuum forming problems at your convenience.

Comet **INDUSTRIES**
9859 FRANKLIN AVENUE
FRANKLIN PARK, ILLINOIS, U.S.A.
Progress in Plastics



Versatile set-up box machine is adaptable to either tight wrap or extension edge boxes—for long or short runs.



Tapemaker produces pressure-sensitive tape in continuous supply for easy application at point of use.

that the packager is, in effect, his own container supplier.

However, most in-plant package making is done on a smaller scale and is the exception rather than the rule. Where such equipment is employed successfully, certain special conditions in regard to handling, storage, inventory control and flexibility of operations are usually involved.

For example, it has been demonstrated in connection with vacuum forming of plastics (See vacuum forming p. 276) that the product can be used as the actual mold when a vacuum-formed transparent dome is used as a principal component of the package. In such cases, the vacuum-forming machine can be used to special advantage in the packager's plant. Die costs are eliminated, package inventory is reduced to sheet stocks, package production is geared to product volume and one step in package assembly, that of putting the product into the plastic dome, is taken in stride during the forming.

Some in-plant package-fabricating machines are designed to solve the

LIPTON KNOWS WHY...



● Shown is the Teepack Tea Bag with its exclusive two compartments and the envelope in which it is inserted. Both the tea bag and envelope are made by Teepack's "Constanta" Tea Bag Machine.

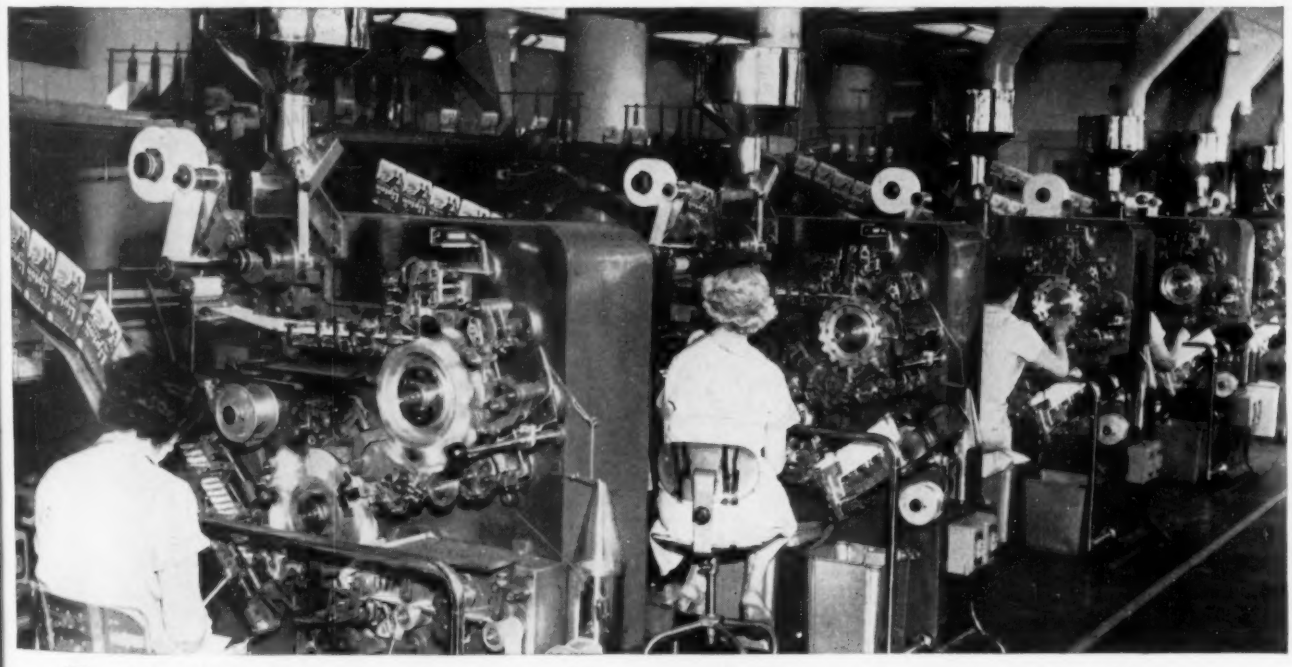
Because—

TEEPACK TEA BAGS are made of *non*-heatsealing, triple-folded filter paper that allows the extraction of *all* the tea's flavor.

TEEPACK TEA BAGS are attached to strings that can't come loose because they're anchored by one staple through many filter paper layers.

TEEPACK TEA BAGS divide the tea into *two* compartments. Boiling water flows *through* as well as around this amazing new tea bag... gets to the tea leaves faster, gives tea a finer, fuller flavor!

TEEPACK TEA BAGS are inserted into individual paper envelopes. Each bag is fully protected and strings can't get tangled up.



These Teepack "Constanta" machines are used by Lipton to make their revolutionary new "Flo-Thru" tea bags. These are the machines used by Lipton in Hoboken, N. J. and in their new plant at Suffolk, Va.

TEEPACK

SPEZIALMASCHINEN G. M. B. H. DUSSELDORF, GERMANY

Makers of the "Constanta" Tea Bag Machine

THE RENKA BAG MACHINE...

Makes Transparent and Translucent Film Bags that DON'T TEAR!



Now available for the first time in America, the Renka Bag Machine will enable you to offer your customers greatly improved bags they have long needed — and couldn't get.

"Renka" bags are tear-resistant because the grain of the film runs *across* the bag — also, because they have string-reinforced fold-over tops. In service, these bags will stand manhandling — and *still look neat.* They'll cut packaging *costs* too, since they can be handled much faster than conventional bags.

Gusset bags with No Bottom or Center Seam

Another of the 12 types of bags the "Renka" makes will help you increase your sales to food and chemical suppliers. For here at last is a truly sift-proof transparent bag — and one that can carry printing on both sides!

Be among the first to produce these unusual film bags — get an important head start. Write or wire today for full information and sample bags.

"RENKA" SPECIFICATIONS

Makes 12 different types of film bags.
Sizes range from 2" to 22½" in length, from 3½" to 13" in width.
Quick changeover from one size to another.
10 minutes for changes in length;
20 minutes for changes in width.
Production speeds: up to 20,000 bags per hour.

U. S. Patent applied for

Exclusive U. S. Representative for the "Renka" Bag Machine

GEVEKE & CO., INC.

25 BROADWAY, NEW YORK 4, N. Y.

Manufacturer's Representatives • Specialized Machinery and Equipment

FOUNDED AMSTERDAM, 1876



Carton former sets up boxes and covers, reducing container storage and handling and transportation costs.

problems that arise when a number of different sizes are required in frequently varying quantities. One compact corrugated—carton fabricating machine is adjustable through such a wide range of shapes and sizes that it constitutes a fairly complete box-making department for the user.

In recent years greater versatility has been engineered into set-up paperbox fabricating machines. As a result, the packager, where specific conditions provide a basis of practicality, can obtain equipment that will fabricate his boxes wholly or in part, including gluing, feeding, wrapping and delivery to conveyors.

Machines that set up folding trays and cartons, particularly the self-locking container types, have gained wide and increasing favor. There are several patented types of trays and carton constructions. One popular

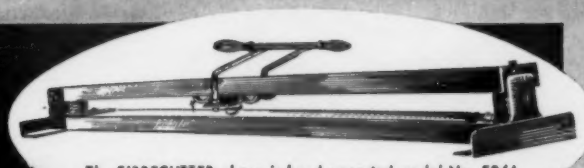


Variety of glued box constructions are handled by this box former.

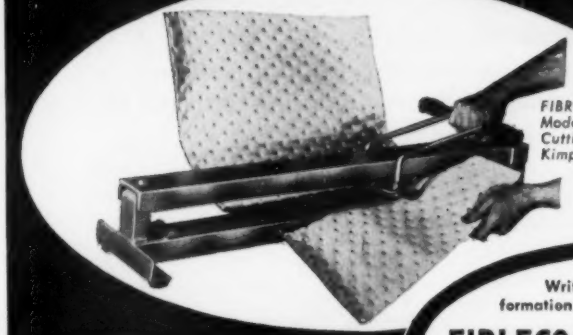
For all-purpose cutting, perforating, scoring

FIBRECUTTER*

Easily Handles "Problem" Materials



The FIBRECUTTER above is hand operated model No. E24A
Stock sizes: 12", 18", 24", 36", 48" and 54"
Wider on order.



FIBRECUTTER
Model No. E24A
Cutting 1/4"
Kimpak Wadding

CUTTING WHEELS INTERCHANGEABLE FOR CUTTING, PERFORATING, SCORING . . .

Cellulose Wadding
Double Face Corrugated
Flexible Corrugated
Flexible Corrugated Tubing
"V" Board
Solid Fibreboard
Heavy Chipboard
Cushioning Materials
Reinforced Waterproof
Gasket Materials
Mural Paper Board
Simulated Leather
Paper Furniture Blankets
Excelsior Pads
Rubber Matting
Linoleum

And a host of other "hard-to-cut" materials

Unconditionally Guaranteed

*Patent Pending

Designed and built for long, hard use, this low cost, versatile cutting device is ideal for package engineering and planning departments —on the packing line, shipping room and sample room.

Write for additional information and Descriptive Literature

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Chicago 40, Illinois

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(Index to Volume 28, September 1954 through August 1955)

■ You will find this extensively cross-referenced Cumulative Editorial Index a welcome time saver in locating editorial material that has appeared over a year's span in regular monthly issues of Modern Packaging magazine. More than that, you'll discover that the Index increases the value of your file copies by providing a considerably more detailed breakdown of their contents—particularly of "buried" references within an article—than is given on the "Contents" page of the issues themselves.

This Cumulative Index is actually a two-in-one affair: an extremely detailed Alphabetical Index (of subjects) plus an Index of Authors.

In the Alphabetical Index, each basic listing by subject is alphabetically cross-referenced wherever such cross-listing is pertinent, by *industry*, by *container* type, and by *material*. As a result, users of the Index are enabled to carry out truly exhaustive packaging research assignments on "short order" and with minimal effort.

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575 Madison Avenue, New York 22, N. Y.

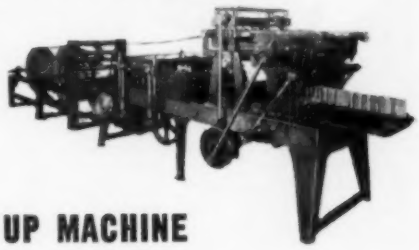
INMAN MACHINES

for the cost-conscious box maker

The purpose of the Inman machines shown here is to speed and mechanize the various operations performed in paper box manufacture . . . thereby reducing costs and improving the quality and quantity of output.

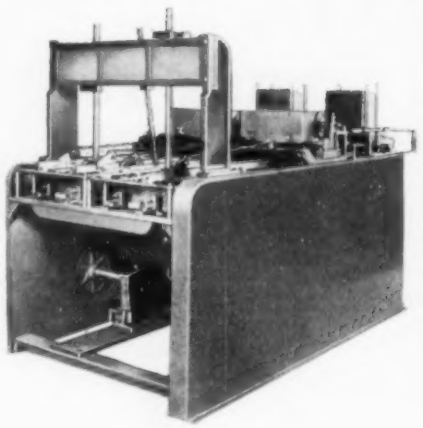
AUTOMATIC ADJUSTABLE PARTITION MACHINE

This reliable Inman unit takes the paper stock from rolls of proper width, slits, dies out, and assembles a wide range of box partitions. Produces up to 3,000 complete partitions per hour, depending on size and type.



DUPLEX AUTOMATIC SETTING UP MACHINE

Packaging plants use this machine for setting up conventional glue lap boxes and covers at up to 150 pieces per minute. A dual production line sets up died out blanks two pieces at a time: one box and one cover, or two boxes, or two covers. Adjustable. Simple and sturdy construction. Also available as a single unit, or for setting up double wall boxes.



ADJUSTABLE DIE TRAY MACHINE

Where dependable output must be coupled with flexibility and rapid changeover, choose the No. 9 Adjustable Die Tray Machine. From the roll, it dies out, creases, pastes and sets up one piece at a time. Speed: 30 per minute. Depth: 1" to 4¾". Width: 6" to 12". Length: 10" to 20". A solid die version of this machine produces up to 75 M pieces per 8-hour day, depending on box size.



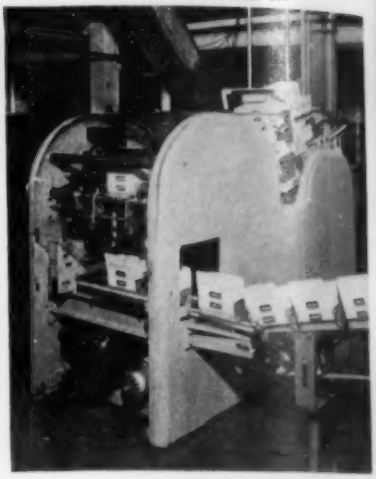
Prices and Delivery on Request

Inman Machines, including slitters and blanking units, have been building an enviable record for reliability and performance for over seventy-five years.

INMAN manufacturing company, inc.

Amsterdam, New York

PHOTO COURTESY PETERS MACHINERY CO.



This carton forming and lining unit handles a range of sizes. Speed: as high as 120 1-lb. cartons a minute.

type of self-locking carton consists of a completely flat one-piece blank, scored at the fold and die cut to form interlocking slots and tabs. The cartons are set up automatically by machine at speeds ranging up to 150 a minute. Some 8 to 10 different styles of locks are available, the principal types being (1) the stripper lock, (2) the high tip, (3) the concealed corner and (4) the hook-trap lock. Choice of a lock style is influenced by the type of product, weight of board and decorative design. Self-locking corrugated boxes also can be set up automatically and a recent innovation is a machine that automatically sets up self-locking cartons and forms and inserts a corrugated glassine liner.

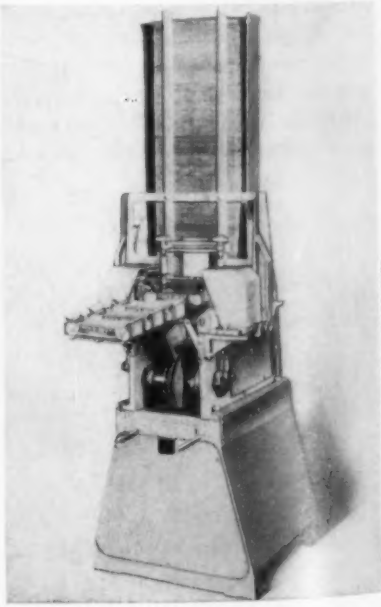


PHOTO COURTESY STANDARD FOLDING TRAY CORP.

Self-locking paperboard trays are automatically set up by this unit.

Consult this Booklet



FLEXOGRAPHIC, ROTO, OIL INK PRINTING PRESSES

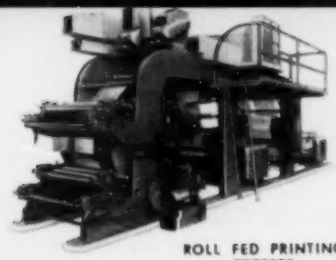
WET OR DRY WAXING MACHINES

LAMINATING AND GUMMING MACHINES

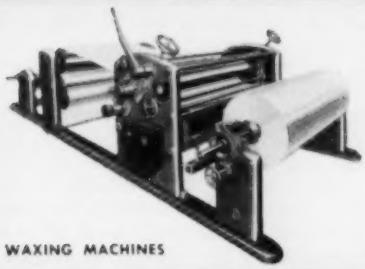
ROLL WINDERS, FOLDERS, SHEETERS

EMBOSSERS AND DIE INKING MACHINES

WRAPPING MACHINES

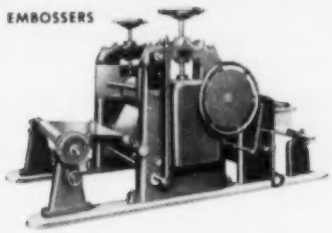


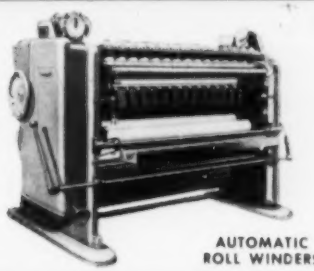
ROLL FED PRINTING PRESSES



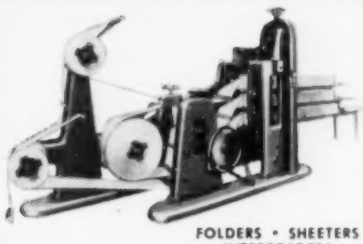
WAXING MACHINES

EMBOSSERS

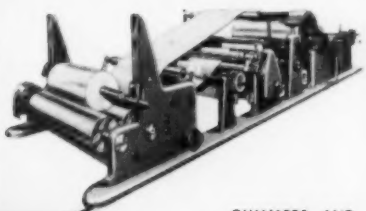




AUTOMATIC ROLL WINDERS



FOLDERS • SHEETERS INTERFOLDERS



GUMMERS AND LAMINATORS

FOR *Precision Engineered* PACKAGING PROCESS EQUIPMENT

Paper, film or foil — If your converting or processing problem is one of Printing, Embossing, Laminating, Waxing, Creping, Folding, Winding or Wrapping you'll find a Hudson Sharp Machine especially designed for the job. Write today for latest machinery brochure which illustrates and describes our complete line.



Get this Booklet, too—

It illustrates and describes the operation of the automatic CAMPBELL WRAPPER — industry's most amazing high speed packaging machine. Learn how you can increase production and effect savings in time, labor and materials.

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Printers, Embossers, Folders, Interfolders, Waxers, Laminators, Wrapping Machines, Core Winders, Packaging Presses, Crepers, and Napkins, Toilet Tissue and Paper Towel Units.

Manufacturers of precision engineered machinery for packaging processing — since 1872

HAMILTON Compound Liner and Dryer

High-speed automatic compound applying and drying of can ends with diameters from 2⅛" to 4¼". Machines supplied for either solvent base or water base compounds. Produces up to 600 ends per minute.

HAMILTON Bodymakers

Only Hamilton offers a complete line of high speed modern bodymakers for general line production of rectangular and round cans. Model is designed for high speed, completely automatic long-run production of can bodies from 2$\frac{1}{16}$" to 4¼" in diameter and 2⅜" to 5$\frac{5}{16}$" in height.

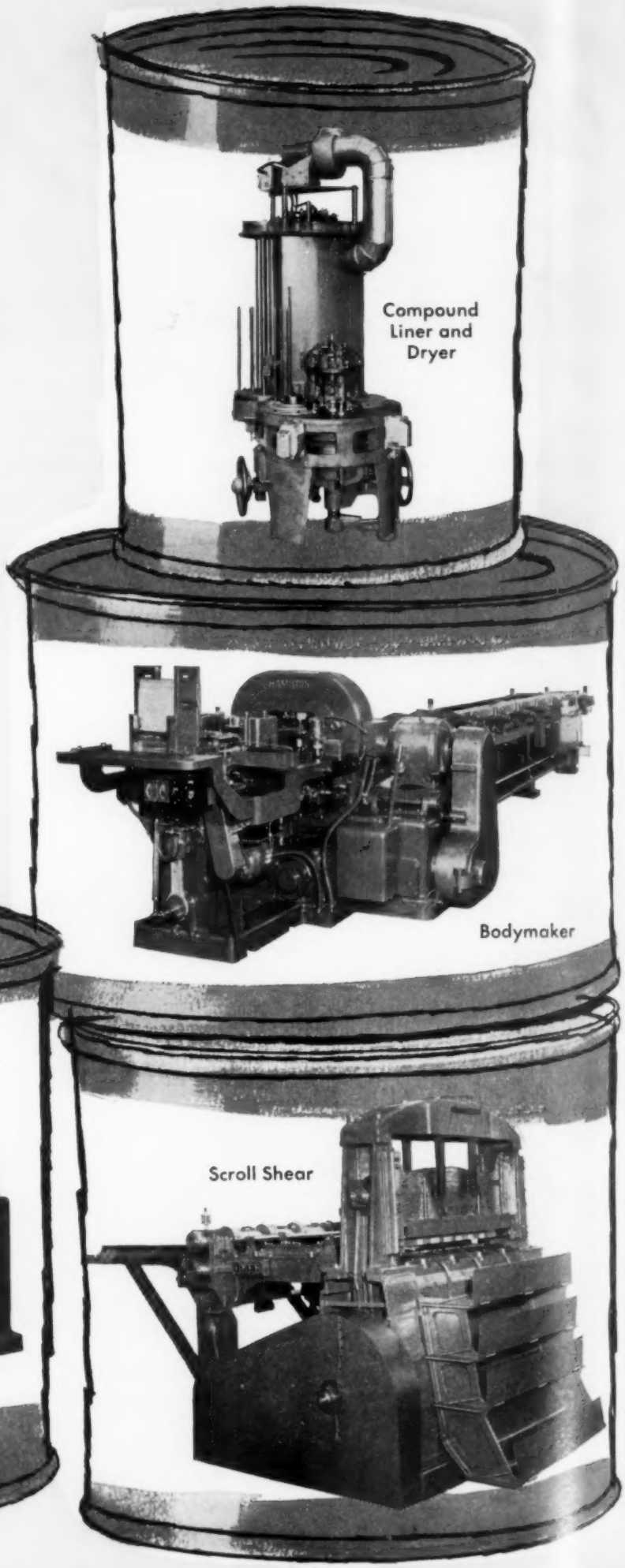
HAMILTON Scroll Shear

Cuts costs by speeding output and saving 4-7% in tinplate. Handles sheets 25" to 36" square up to 125 strokes per minute.

HAMILTON Can Body Flanger

Model 301 automatically flanges 300 to 600 cans per minute, depending on your requirements . . . for round cans up to 4¼" diameter. For the higher speeds an automatic spiral feed can be supplied. Three other high-speed flangers for larger round cans and square cans.

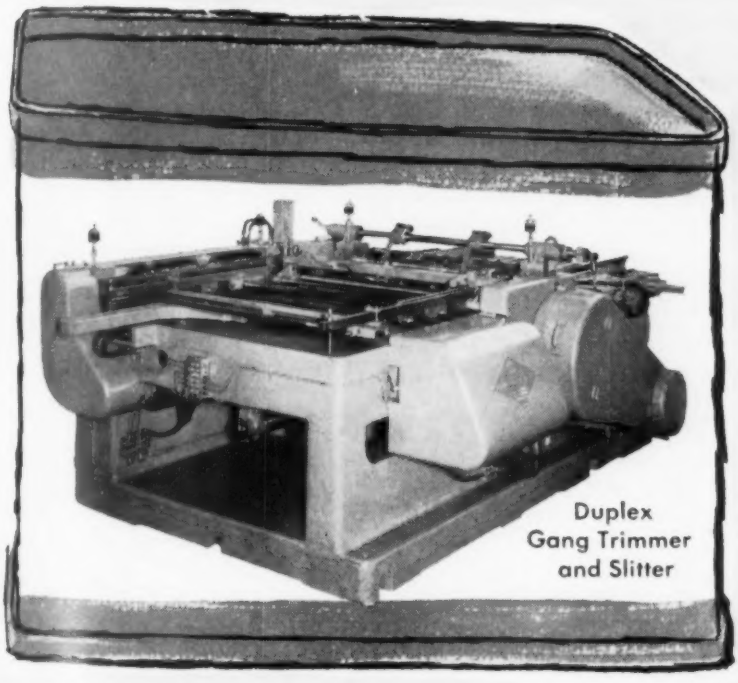
Contact us for details of Hamilton's continuing progressive development of revolutionary machines that can cut drastically your can making costs! Write today to Hamilton Division, Baldwin-Lima-Hamilton Corporation, Hamilton, Ohio.



HAMILTON

world's most complete line
of modern, high-speed
cost-cutting can-making machinery

Hamilton Division
BALDWIN-LIMA-HAMILTON



HAMILTON Duplex Gang Trimmer and Slitter
Boosts production by slitting up to seventy 36" sheets and cutting them into body blanks each minute. Newly designed for less maintenance and lower operating costs.



HAMILTON Can Tester
Capable of speeds above 300 cans per minute, model 301 automatically tests sanitary cans with diameters up to 4¼" and heights up to 7⅞". Model 302 tests larger cans.

Bag-making machines

Equipment for making flexible packages may be regarded from two points of view: (1) that of mass production by makers of packaging supplies and (2) that for in-plant operations by package users. Except for reference and comparison, this article will discuss only equipment of the second type. (See also Section 4, "Films, Foils and Laminations," p. 93 and Section 7, "Flexible and Unit Containers," p. 239.

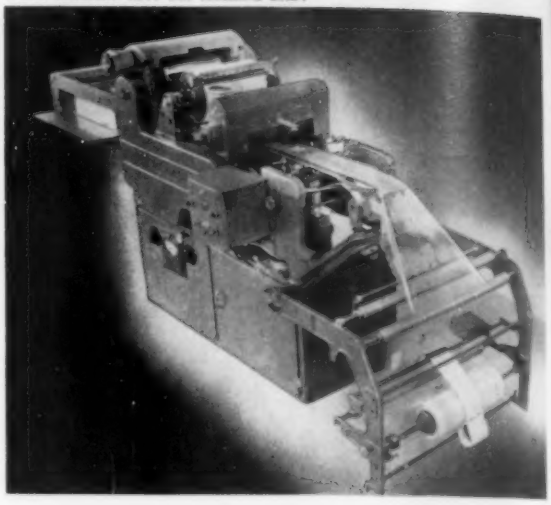
There are four general types of bag structure, each requiring a distinct type of bag-making machinery: (a) flat and square, (b) self-opening (automatic), (c) satchel-bottom and (d) valve-pack or double-bottom.

A flat or square bag is of very simple construction. Its uses include grocery bags, notion and millinery bags, and garment bags. Because of the simple construction of this type of bag, the equipment required is also of rather simple design, making it possible to attain speeds, up to 2,000 bags per minute in smaller sizes.

The self-opening bag (sometimes called the "automatic") is the most complicated type of bag because of its gusseted-tube construction and the complex type of bottom folds and formation. Nevertheless, equipment for the production of S.O.S. bags has been developed to the point of very high production, with speeds exceeding 500 a minute.

The general difference between the S.O.S. type of bag and the satchel-bottom bag is that the satchel-bottom bag is made from a flat tube, while the S.O.S. bag is constructed from a gusseted tube.

PHOTO COURTESY ROTO BAG MACHINE CORP.



Machine makes flat gusset-style bag from sheeting or tubular stock. Speed 70 to 100 bags a minute.

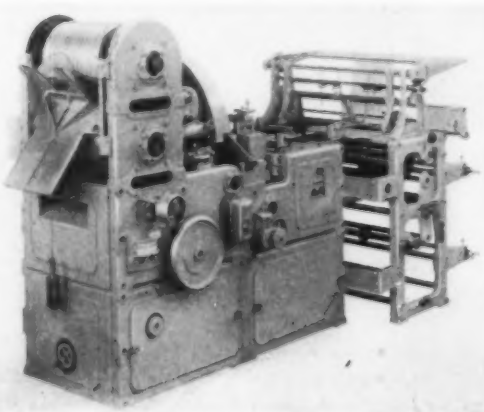
Despite the fact that satchel-bottom bags are somewhat simpler, production speeds are practically identical to those attained in the production of S.O.S. bags. The similarity between the two types is so great that an S.O.S. machine can be changed over without too much difficulty.

Valve-pack bags are made in two different ways. One type is made from a multiwall flat tube. Bottoms are formed on both ends of the tube. The bottoms formed on such a bag are of the satchel-bottom type. One side of one of the bottoms is left unpasted, enabling the bag to be filled by blowing the product into it. This is the method of packing cement, sugar, flour, lime and like products.

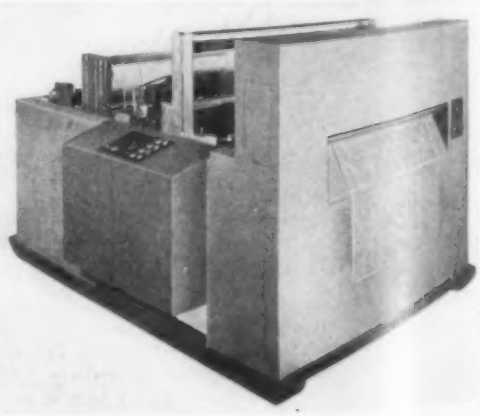
The second type of double-bottom valve-pack bags is known as the "sewn" type and utilizes a gusseted multiwall tube which is formed on tubing equipment. However, in order to bottom such tubes, they must be fed sidewise onto a sewing table on which are attached two opposing sewing heads. As the bags are automatically fed past these sewing heads, a paper tape is fed to each end of the bag and folded over the ends. At the same time, the tape is securely sewn, thus completing the closure. A valve opening is left at one corner of the ends for valve packing. In most sewn-end bags, a filler cord is automatically fed to the sewing heads and the stitching is done through this cord to eliminate any possibility that the product may later sift through the seam. Today machines are available which can be integrated with the packaging line or not, as desired.

See also "Pouch Formers, Fillers, Sealers," p. 470 and "Heat-Sealing Equipment," p. 462.

PHOTO COURTESY SIMPLEX PACKAGING MACHINERY, INC.

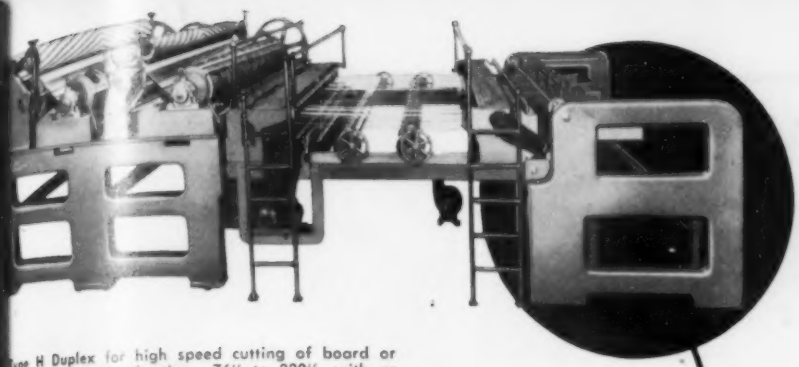


Machine makes flat or gusset, single or duplex bags. Size range: length, 3½ to 18 in.; width, 2 to 12 in. Speed, 200 or more a minute..

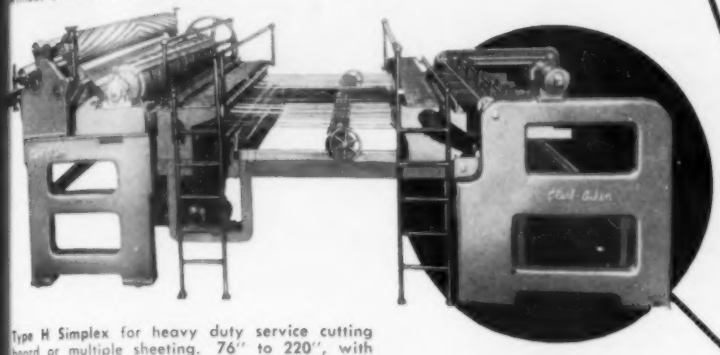


This automatic polyethylene bag maker fabricates bags and liners up to 46 by 65 in. in size.

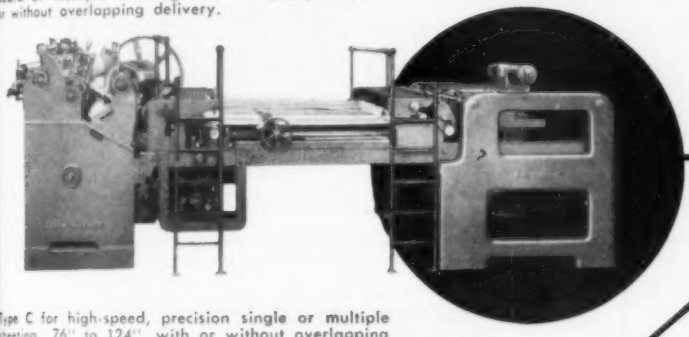
you can have a *Clark-Aiken* CUTTER LAYBOY UNIT *exactly* suited to your needs *at no greater cost!*



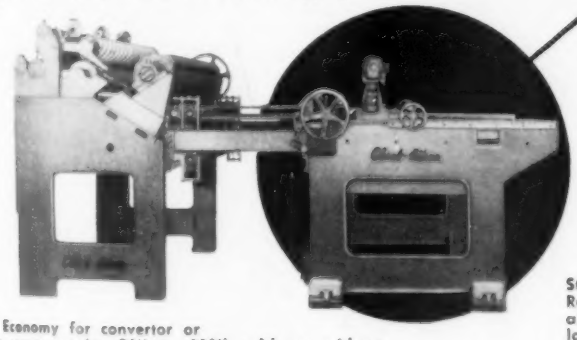
Type H Duplex for high speed cutting of board or pulp and multiple sheeting. 76" to 220", with or without overlapping delivery.



Type H Simplex for heavy duty service cutting board or multiple sheeting. 76" to 220", with or without overlapping delivery.



Type C for high-speed, precision single or multiple sheeting. 76" to 124", with or without overlapping delivery.

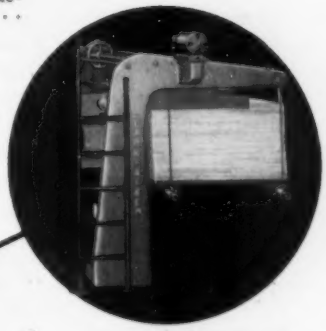


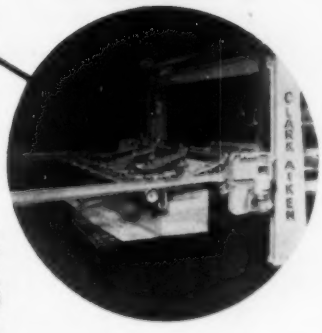
Type D Economy for convertor or finishing room service 36" to 100", with or without overlapping delivery.

Standard Type Layboy. Rugged, precision-built; adjustable automatic lowering and fast return pile table.

OR

Overhanging Type Layboy for end or side pile removal, greater pile height, fast skid removal and replacement, quick return . . . Saves space.





Vickery Type Layboy. Entirely different. Skids remain stationary; delivery rises as pile height increases. End or side pile removal permits use of track system for quick skid removal and replacement.

Clark-Aiken Stub Arbors save time and labor. One size fits rolls of any width. Write for bulletin.

for faster, better, more economical sheeting

Clark-Aiken's complete line offers a cutter of the exact size and type to handle your sheeting operations most efficiently and economically with a layboy exactly suited to your requirements and operating conditions.

With correct movable rollstands and continuous operation, you can enjoy sustained high-speed sheeting with sustained accuracy, negligible broke and minimum maintenance at least 98% of the time, regardless of width of rolls, thanks to such Clark-Aiken features as

- Super-rigid construction, heavy cast frames
- Oversize pinch roll and oversize sand-blasted draw roll for positive feed of any material
- Lifetime tapes for long wear, freedom from stretch
- Straight-line sheet squaring eliminates possibility of paper buckling
- Patented self-sharpening, scissors-action "Spiral Shear" cylinder knife for clean, sharp cutting
- Independent motor-driven cam-operated joggers
- and many others

Clark-Aiken engineers will gladly study your operations and help you select the unit which will bring your sheeting costs down to rock bottom. Write, wire or phone

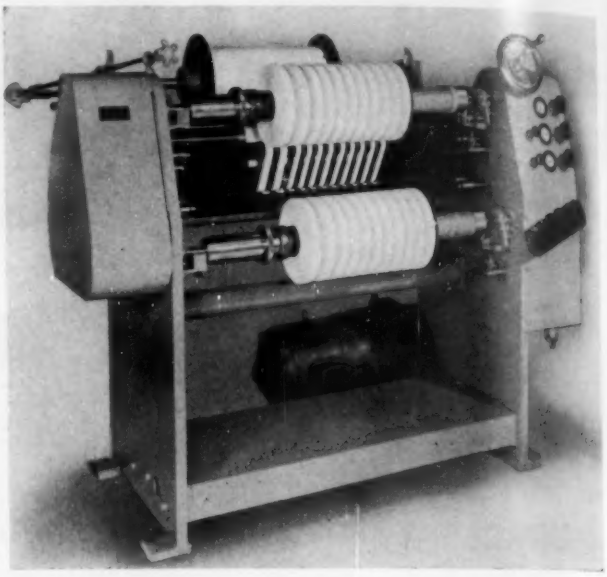
THE CLARK-AIKEN COMPANY
56 Paul Street • Lee, Massachusetts

Clark-Aiken SUSTAINED-OPERATION SUSTAINED-ACCURACY **CUTTER LAYBOY UNITS**

DUSENBERY

SHEAR CUT AND RAZOR BLADE

SLITTER MODEL 635



This machine utilizes the latest technique in slitting plastic film, laminated foil, tape, glass cloth and paper. It has been thoroughly tested by the largest producer of plastic film and is now being used in their plants. While used for large scale production slitting, several of our customers are now using the Model 635 in their engineering departments and laboratories for slitting and rewinding new materials in small production runs, because of its versatility.

This machine can be supplied as either shear cut or razor blade cut or both. Change over from shear cut to razor blade can be done in a matter of minutes, therefore allowing complete flexibility. All tension controls on the unwind and rewind are air operated to determine the optimum running conditions for a given material, and to enable your people to repeat machine settings without guess work.

Write for full information

MODEL 635 • WIDTH 32"-42"-52"

TYPE 635 AB — REWIND 13½" • UNWIND 18"

TYPE 635 AC — REWIND 18" • UNWIND 42"

CORE SIZES AVAILABLE 1" THROUGH 6" • MINIMUM SLIT WIDTH ¼"

SPEEDS 1,000 FPM OR MORE

BOTH MACHINES CAN BE SUPPLIED WITH OUR MODEL 704 UNWIND STAND FEATURING PRECISE WEB GUIDING AND AIR OPERATED TENSION CONTROLS

JOHN Dusenbery COMPANY, INC.
275 GROVE AVENUE
VERONA, N. J.
Tel. Verona 8-3915



. . . They're Engineered for Your Specific Requirements

First we analyze your problem. Then we give you a "complete winding package" — tailor made to your needs — including motor, winder, stands and all other accessories.

We make 5 different types of winders for handling webs, sheets and single strands. One of them is surely adaptable to your needs.

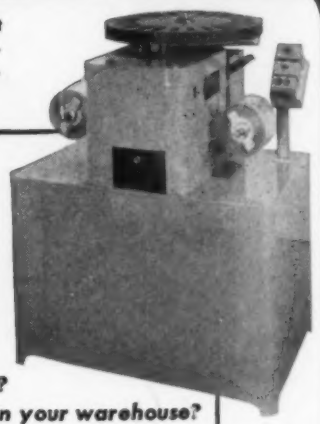
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PAK-RAPID equipment eliminates old-fashioned, manual packaging operations.



DO YOU

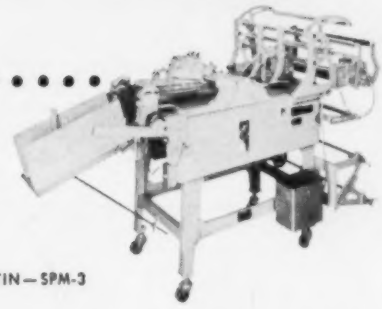
1. *Buy prefab bags?*
2. *Inventory them in your warehouse?*
3. *Print them at added cost?*
4. *Deliver them to the operation?*
5. *Open them by hand?*
6. *Hand fill them?*
7. *Seal them by hand?*
8. *Count them by hand?*

ONE PAK-RAPID MACHINE ELIMINATES THESE OLD-FASHIONED METHODS, DOES THESE JOBS AUTOMATICALLY IN A ONCE THROUGH OPERATION.

In addition, it gives you: versatility-efficiency-economy-simplicity. Get full details and new literature from your PAK-RAPID representative or, write us direct.

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Builders of Fine Packaging Machines
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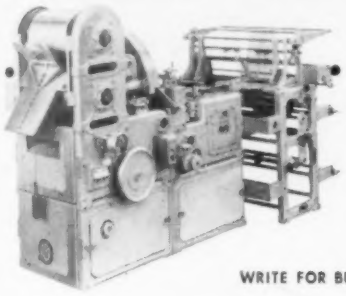
Simplex® for High-Speed, Low-Cost tite-seal BAG MAKING and Fully Automatic Packaging



VERSATILE MULTI-DUTY BAG MACHINES

Five models of Simplex Cellophane heat seal bag machines with a wide selection of attachments produce single or duplex-wall bags, flat or gusset from plain or printed stock in bag sizes up to 17″ wide by 28″ long. Speeds up to 6,000 bags per hour on certain sizes.

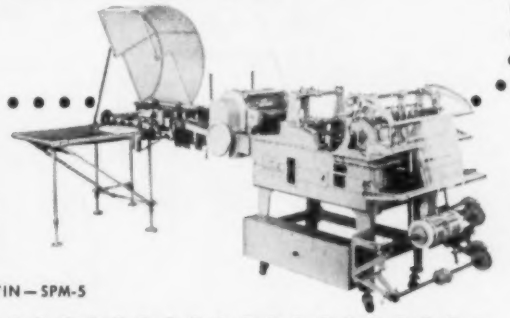
WRITE FOR BULLETIN—SPM-3



HI-SPEED AUTOMATIC CELLOPHANE BAG MACHINE

The new Simplex "300" provides heat and glue *tite-seal* bottom and corners with speeds up to 18,000 bags per hour; infinite adjustment for bag lengths from 3½″ to 18″, and widths from 2″ to 12″; precision two-way registration with ease of operation and changeover.

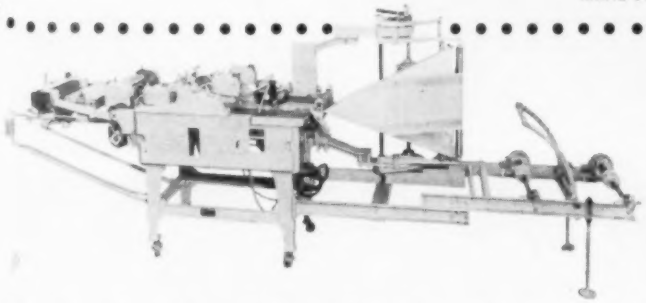
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POLYETHYLENE BAG MACHINES

High quality production at low cost on light to heavy mil Poly bags. Bag sizes up to 23½″ wide by 32″ long, and longer with skip-cut on large model. Handles flat stock and tubing, plain or printed—with or without hole punch. Round bottom bags produced on Model 24-7R.

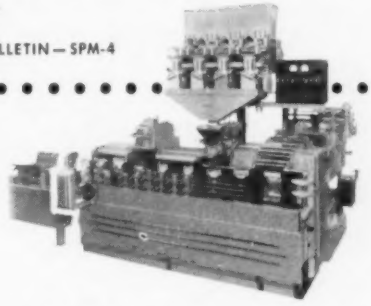
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AUTOMATIC POUCH MAKING MACHINES

For economical pouch making with scrim coated paper, scrim-backed foils, aluminum foils, Poly-Cello laminates, Poly-Vinyl films and coated filter paper. Pouch sizes range from 1½″ by 3½″ to 24″ by 30″, and additional lengths with skip-cut. Features include Electric eye, Pressure Control, and various attachments.

WRITE FOR BULLETIN—SPM-4



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Combining bag making, weighing or measuring, filling, sealing and checking in one continuous Automatic operation, Simplex-O-Matic packaging machines are adaptable for single or duplex wall, flat or gusset bags with net-weight for volumetric fillers.

WRITE FOR BULLETIN—SOM-1

ELECTRONIC BAG MACHINES & TOP SEALER for Saran and Vinyl film available for speeds up to 60 bags per minute.

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Coating and laminating equipment

by G. L. BOOTH*

Raw materials for the manufacture of flexible packages frequently fall into two main categories—coated products and laminated products. There are some exceptions, such as cellulosic films, foils and unsupported thermoplastic resins, but even they may be laminated or coated.

*Research Engineer, Dilts Machine Works, Div. of The Black-Clawson Co., Hamilton, Ohio.

Because the packager frequently is called upon to choose between various methods of production of the materials he uses, the following discussion is intended to brief him on the methods and machinery generally used in coating and laminating.

Knife Coaters. The many coaters in use today are derived from a few basic machines. One of the most common is the knife coater. There are several versions with one basic idea—the smooth application of coating to the web with a knife. Thick vinyl dispersions and rubber cements are usually applied as coatings in this manner, simply because no better method has been found. Some packaging products manufactured in this way include vinyl-coated papers and

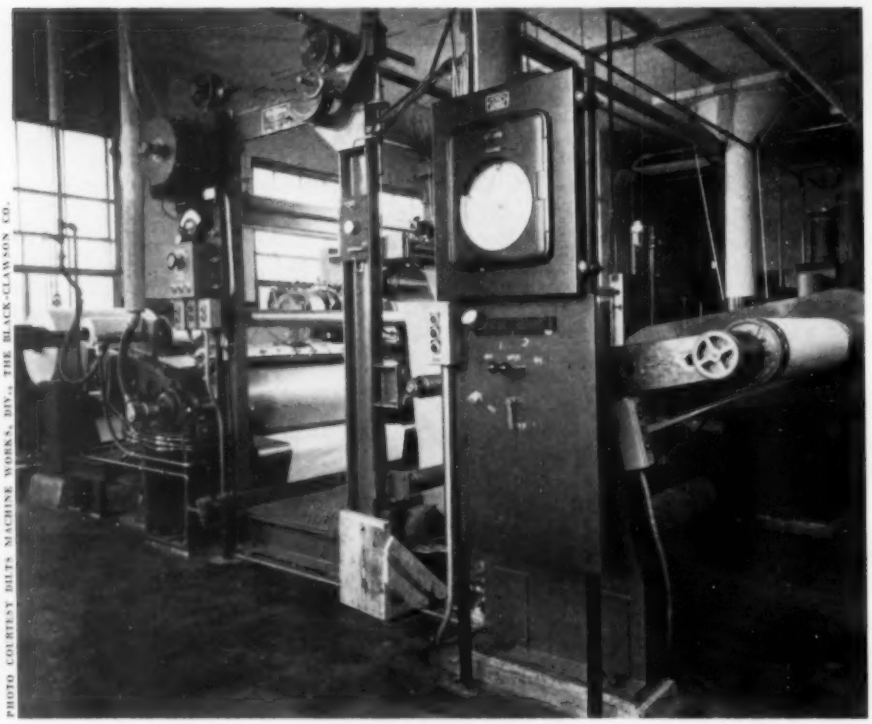


PHOTO COURTESY DILTS MACHINE WORKS, DIV., THE BLACK-CLAWSON CO.

Polyethylene extruder-laminator (left) reduces pellets of pure polyethylene to a variety of finishes from high gloss to mat types, at the same time laminating the plastic to foil or paper. The machine produces sheets of laminated material up to 48 in. wide in a great variety of thicknesses.

Paperboard is vinyl coated, or thin film is heat-seal coated equally well on triple-head knife coater (below, left). Thickness is controlled by height of blade from web.

This roll coater (below) will double- or triple-wax-laminate nonbleed foil or glassine to bleed-through tissue to produce an effective heat-seal wrap for cookies, cereals or soaps.

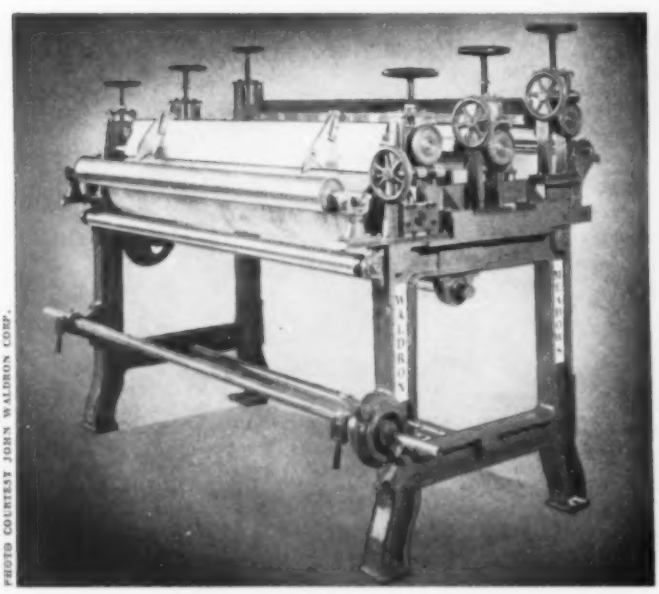
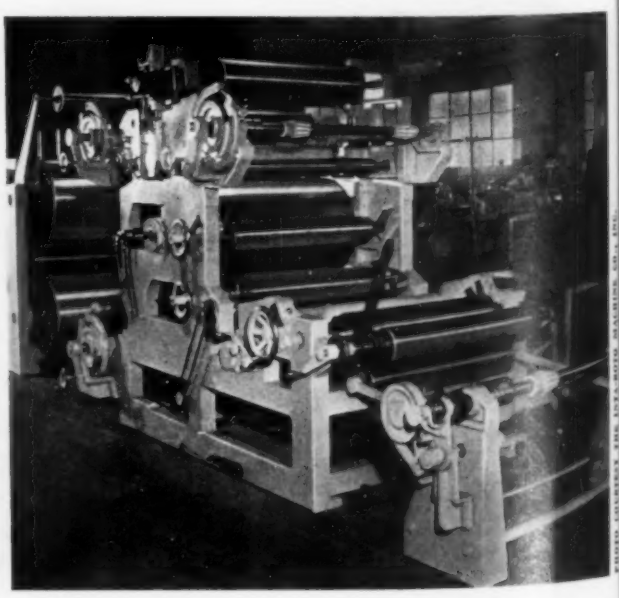


PHOTO COURTESY JOHN WALDRON CORP.

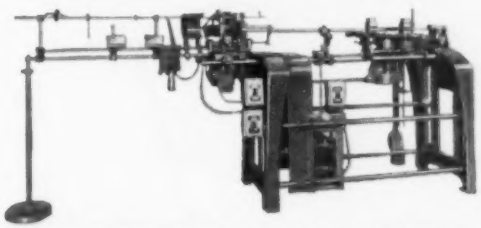


IT ADDS UP!

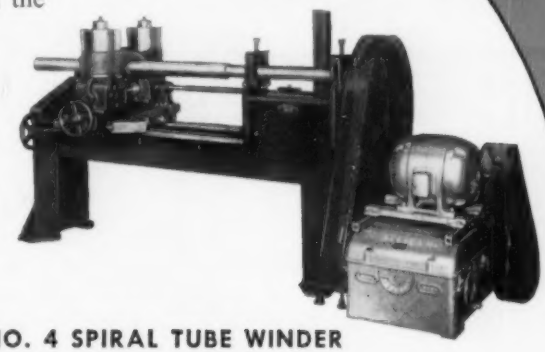
YOU GET MORE *and better* CONTAINERS PER $ WITH PAPER WOUND CANS, CORES AND TUBES



Knowlton machines are paying off TWO WAYS for leading manufacturers who have gone "paper-wound" as the most logical way to solve their container cost problem: (1) Paper wound containers not only *cost less* to produce—they offer definite *profit making advantages* to sales, display and shipping. (2) Cost conscious package people know that Knowlton machines are *proven money savers* that up output, last longer and cost less to maintain! Call a Knowlton man and get the complete paper-wound *profit story*.

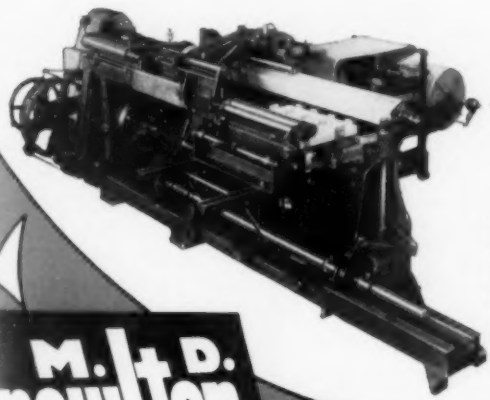


NO. 77 KNOWLTON SPIRAL TUBE WINDER AND CUT-OFF. Winds paper tubes from 2 to 5 plies and from ¼″ min. to 1″ max. in diameter.



NO. 4 SPIRAL TUBE WINDER

Winds paper tubes from ¾″ to 10″ diameter depending on number of plies: 2-5 plies up to 10″ diameter; 3-11 plies to 8″ diameter; 12-22 plies to 6″ diameter. Available with cut-offs and glue stands to fit all needs. Optional machines for cutting tubes in single or multiple lengths, rough or finished cores, or cutting light and heavy side walls up to ½″ thickness.



AUTOMATIC CONVOLUTE PAPER CAN WINDER

Winds paper can bodies from 1¾″ to 8″ in diameter on the round and from 1½″ to 8″ across diagonal corners on irregular shapes such as square, rectangular, oval, etc.

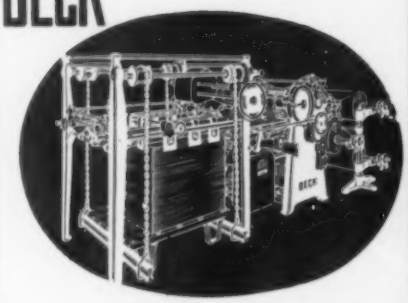
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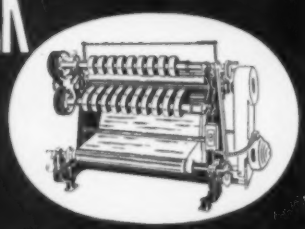
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- Sheets anything — cellophane to light board — from rolls.
- 100% automatic cut register for printed webs with Photo-electric Cut-Off Register Control.
- Neat, high piling on long uninterrupted production runs with Automatic Sheet Piler.
- Tremendously high speed production with Speedlap unit.

Pacemakers since 1864 in the engineered application of sheet cutters and slitters.

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RAZOR BLADE SLITTER and REWINDER

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- Slits and rewinds all films, plastics and other fine materials to any width with economical, easily changed razor blades.
- Set-up is quick, accurate and simple with new setting gauge.
- Perfect control from parent roll to rewind, featuring Beck's exclusive Individual Web Tension.

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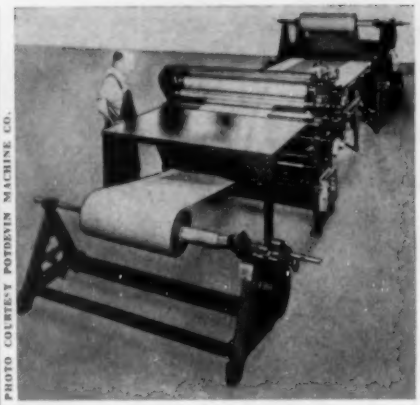


PHOTO COURTESY POTDEVIN MACHINE CO.

This conveyor-gluer-laminator unit handles many types of materials varying in both thickness and composition.

paperboard for food containers, heat-seal coatings, leatherette, many decorative webs and clear or pigmented films that are stripped from the coating paper or fabric and used as unsupported webs. Speeds from 10 to 150 fpm are common.

Roll Coaters. Most roll coaters are of the one-, two- and three-roll type, although some four-roll machines are in use. One-, two- and three-roll coaters are perhaps the simplest roll-coating machines in use today. However, the control of coating they give is limited and ridging of coatings sometimes limits speed.

Starch, clay and latex are some of the coatings readily applied by roll coaters. Most of the printing grades of coated paperboard and paper are prepared on these machines. Saturation with phenolics, latices and wet-strength materials can be effected with two- and three-roll squeeze coaters. Sometimes a knife or metering bar is used in conjunction with the squeeze or roll application to remove excess or smooth the coating.

Squeeze coating is ordinarily used in waxing, laminating and impregnating operations. Kiss coating is simply an application of coating material made by passing a web over the applicator roll without using a back-up roll. The web is kept in contact with the roll by means of web tension used in conjunction with hold-down rolls. The web tension in conjunction with a metering bar also provides a control of the coating deposit.

Waxers. There are three basic ways of applying wax to a web. In one, the web is run into the hot wax bath and then through a set of squeeze rolls to control the wax content. This is called *wet waxing*. The waxed sheet

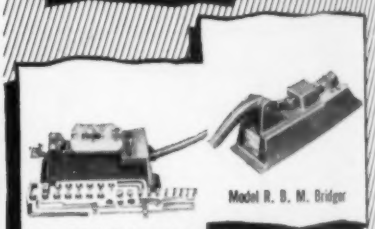
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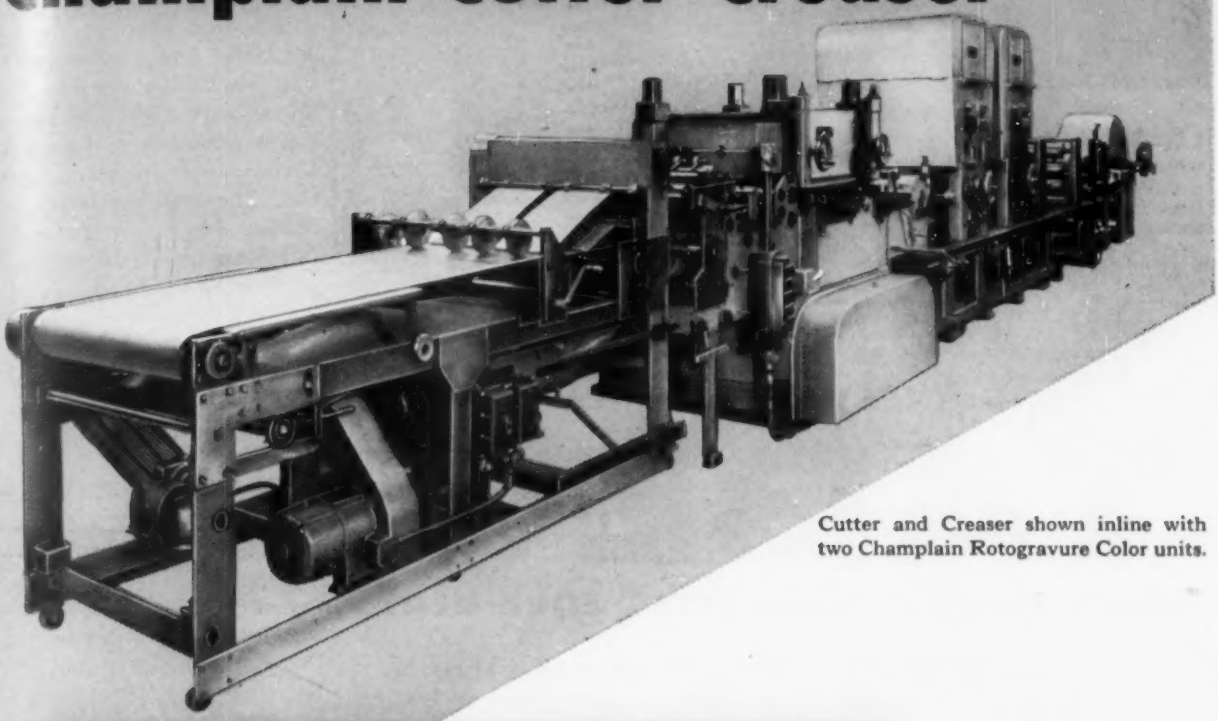


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HEADQUARTERS FOR STEEL RULE DIE MAKING EQUIPMENT AND SUPPLIES SINCE 1900

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From this NEW roll-fed Champlain Cutter-Creaser



Cutter and Creaser shown inline with two Champlain Rotogravure Color units.

PLATEN PRESS QUALITY CARTONS

at better than cylinder press speeds

At last – a Cutter-Creaser that puts the manufacture of high quality but low-cost cartons well within the reach of *all* carton makers. In *one* pass, it cuts, creases, and automatically strips cartons from a continuous web – and brings to the carton manufacturer all these PLUS advantages:

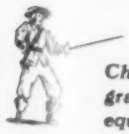
- **INCREASED PRODUCTION RATE** . . . 7,500 to 10,500 impressions per hour.
- **MAXIMUM QUALITY** . . . the high quality of platen press cutting and creasing – at better than cylinder press speeds.
- **THOROUGH AUTOMATIC STRIPPING** . . . all intricate internal and interlocked scrap is stripped and carried away *automatically*.
- **LOW DIE COST** . . . with inexpensive steel rule and block or jig dies.
- **CONSISTENT ACCURACY** . . . patented intermittent feed insures uniform accuracy, even at highest speeds.
- **MINIMUM DOWN TIME** . . . changing of dies and make-ready is only a matter of minutes.

By itself, this new Cutter-Creaser has no equal. But when used *inline* – with rotary printing equipment – you gain not only the advantages of the Cutter-Creaser but *all* these *additional* advantages:



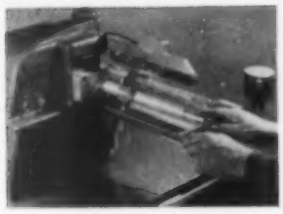
- **ABSOLUTE MINIMUM HANDLING OF STOCK** . . . "once through the press" principle means no carting and storage between Multi-color Printing, Lacquering, Die-Cutting and Stripping.
- **IMMEDIATE INSPECTION OF FINISHED CARTONS** . . . from roll stock to finished cartons takes only a few seconds.
- **ACCURATE REGISTER** . . . quick, one-pass operation of all inline equipment allows no time for change in character of stock.
- **MINIMUM SET-UP TIME** . . . no die impression needed for printing register—dies and plates are pre-matched.

Champlain



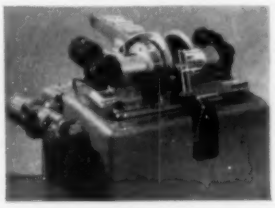
Champlain manufactures a complete line of rotogravure, flexography, rotary letterpress and allied equipment for packaging and specialty printing.

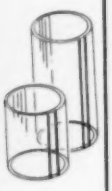
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Completely re-engineered for greater speed. Beads 500-900 cylinders per hr. Fully automatic! Operator places the cylinders in chute and the beaded cylinders are automatically ejected.



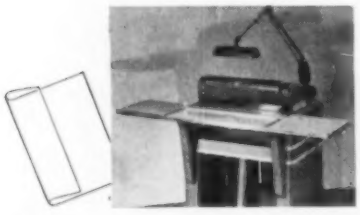


• **NEW TABER CYLINDER MAKER**
New, improved model assures greater speed and fewer rejects. Automatic sizing eliminates crooked seams, misfitting bodies, etc. Expanding mandrel (1½" to 8½" diam.) and sealing bar are foot operated.

You'll get faster production ...fewer rejects with

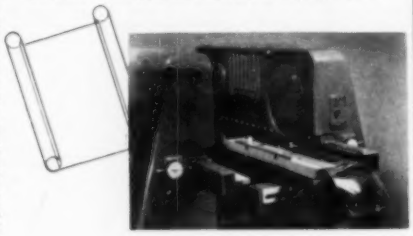
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SHEET PLASTIC FABRICATING EQUIPMENT



• **180° PLASTIC FOLDER**
Forms the desired fold under heat and pressure resulting in a permanent shape eliminating tearing and cracking. Folds cellulose acetate sheet .005" to .020" thickness in "U" type 180° fold with "snap." Does 700 single folds per hour or MORE with multiple folding. Front gauging tables now standard equipment.

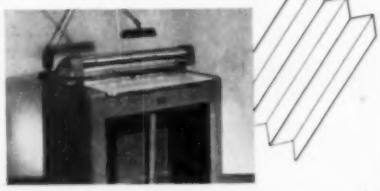
• **STRAIGHT EDGE BEADER**
Beads two edges at once at HIGH speed of transparent acetate rolls, strips or blanks 2" to 20" wide. Cuts costs drastically. Heads can each be used as single edge beaders. Pyrometer temperature control included as standard equipment.







• **TABER CREASER**
"Instant-Crease" feature gives MORE right-angle creases in LESS time and fewer rejects. Handles .005" to .020" thickness cellulose acetate up to 30" wide. Designed to handle 2 blades if desired.



• **PNEUMATIC DRAW PRESS**
For drawing and forming cast or extruded plastic sheet into round, oval or special shape closures. Takes interchangeable dies from 2" to 8½" diam. and ⅛" to 1" in height. Adjustable from 5 P.S.I. to full line pressure.

Write to Section 20 for illustrated literature

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is then fed into a tank of refrigerated water to chill the wax quickly and give it a high gloss. Knife doctors remove the water from the web and it is then cooled and rewound.

Made on this machine are bread wraps, frozen-food wrappers, heavily waxed paperboard for moistureproof containers and inner retail package liners for cereals, dry cake mixes, etc. Speeds over 1,000 fpm are possible.

The second type, *dry waxing*, usually requires a three-roll waxing section. The wax is picked up by the bottom roll and transferred to the center rubber roll, where it is applied to the web. The wax content is controlled by the squeeze between the middle and top rubber rolls. Speeds approach 2,000 fpm. Wet waxing can also be done on this machine.

This type of operation is used to produce stock for drinking cups, butcher paper, food containers and relatively moistureproof cartons on which surface wax is undesirable.

The third type of waxing is called *one-side waxing* and is essentially the same procedure as dry waxing except that the wax remains on the surface. Sometimes low percentages of polyethylene are blended with the wax to give the coating better scuff resistance, heat-sealing properties and antiblocking qualities. Products manufactured by this method are locker papers, gelatine wraps, candy and cake-mix wraps, soap liners, etc.

Paraffin waxes are most commonly used. To strengthen the moisture barrier, increase scuff resistance, improve gloss or enhance the fold qualities at extreme temperatures, polyethylene, microcrystalline or carnauba waxes are added to the paraffin base.

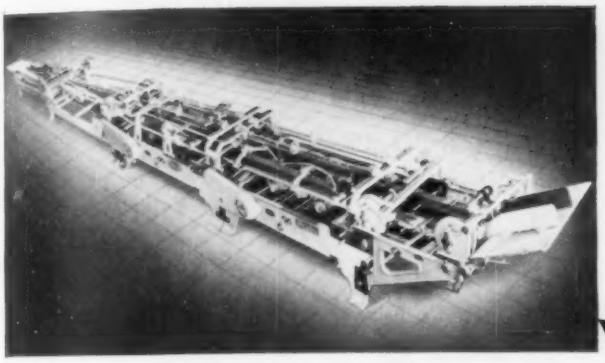
Gravure coaters use an engraved roll which runs partially submerged in the coating with an oscillating doctor to wipe off any excess coating material, leaving only the interstices of the etching filled with the coating. Coatings can be applied directly to the web from the gravure roll or can be transferred to a rubber roll and then to the web. The latter is known as offset gravure and reduces the pattern transfer from the gravure roll. A smoothing bar is sometimes used to remove the gravure-roll pattern. Hot-melt and dispersed coatings can be applied in this manner.

Decorative coatings like lacquers and relatively fluid coatings of low solids content are applied in this manner. Very thin coatings can be

Paper Package Machinery

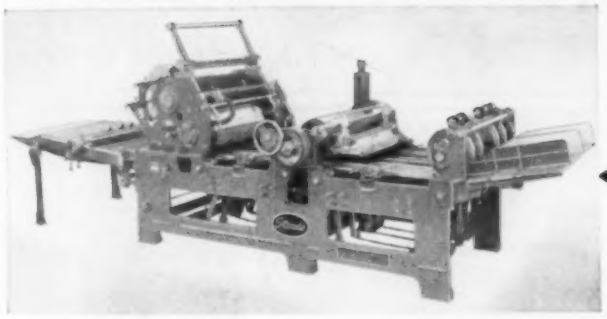
for SET-UP and FOLDING cartons





"5050" ARISTOCRAT

This Staude 180° Pre-breaking Gluer fills the need for a machine that will handle heavier, tougher board and perform more accurate, uniform prebreaking and folding at high speeds. The "5050" will handle carton blanks up to 50" wide x 50" long. Numerous features in prefolding and gluer section design provides almost unbelievable flexibility and accessibility. The Aristocrat is a quality-designed, quality-built machine that will give maximum service at low operating cost.

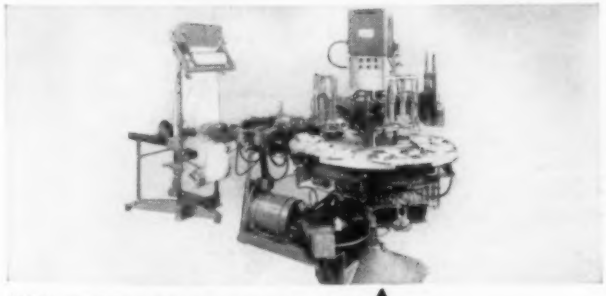


THE "MASTER" INFOLD GLUER

A versatile, straight line unit, the Master automatically feeds, glues, infolds and outfolds collapsible set-up carton blanks. Speeds range up to 350 folded cartons per minute. The Master's sustained high speed output is made possible by using patented traveling folding members . . . corner folds are made and adhesive applied while the blank is in motion! Blank sizes from 4¾" x 5" to 33" x 28" can be handled. Another Staude design packed with features that increase quality, profit and output.

STAUDE "GLADIATOR"

An extremely versatile window patch gluing and lining machine, the Gladiator has a wide working range. It applies films and other materials used for lining frozen food cartons as well as windows for doughnut, gum and similar carton types. A host of features put the Gladiator above all others in its field.



HIGH PRODUCTION VUE-MATIC

Acetate boxes and covers are formed and electronically sealed by this product of Staude's High Production Division. The Vue-Matic works directly from acetate roll stock slit to proper width. Maximum sheet size is 14" x 10". Maximum box sizes are 10" x 6" x 2" or 8" x 4" x 3" with a 4" x ¾" x ½" minimum. High frequency diaelectric heating makes narrow, permanent transparent welds without solvents. Only one operator is required to run the Vue-Matic.



ALPHA-AUTO FEED

This semi-automatic Wrapper and Gluer is an ideal companion to the Vue-Matic. It gives top production with quick changeover for short or long runs of tight wrapped stayed boxes. Size capacities range from 15" x 9¼" x 2⅝" down to 3¼" x 1⅜" x ½". An inexperienced operator can produce up to 2000 pieces per hour on average sizes. Use the Alpha-Auto Feed to produce the set-up boxes that form the bottom of transparent cover packages.

Send for comprehensive literature on these machines, and let us tell you about other Staude and High Production Division machines—including the Staude "1000" Rotogravure Press—that are designed specifically to serve the packaging industry. (If you have a packaging problem, let our engineers help you in its solution.) They can recommend the proper machine with accessories to perform your job most efficiently.

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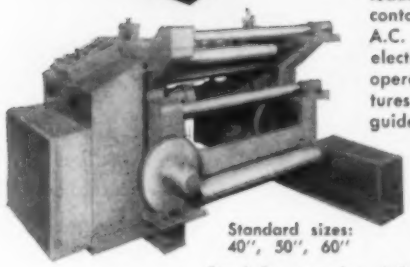
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Shear type cutters spring loaded for positive accurate contact. 3 phase, 60 cycle A.C. motor drives through electric clutch for smooth operation. Many special features such as automatic web guide, static eliminator and blower type trim remover with receptacle. Available with Hobbs-Alquist rewind constant tension control.



Standard sizes: 40", 50", 60"

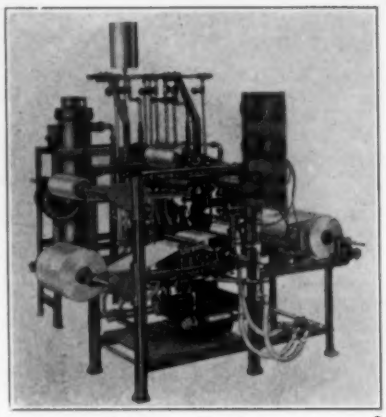
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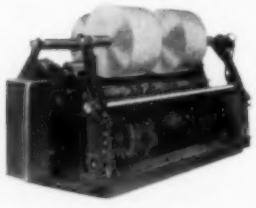
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Embossers	
Slitter-Rewinders	
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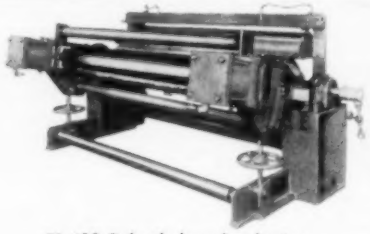
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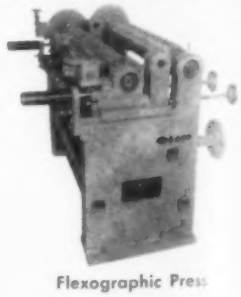
Single Embosser



PL-400 Polyethylene Laminator



Waxing Machine



Flexographic Press

THE BLACK-CLAWSON COMPANY
DILTS MACHINE WORKS DIVISION, FULTON, N. Y.

precisely controlled, since the depth of the pattern dictates the amount of material deposited. Hot melts, pyroxylin and heat-sealed coatings are ordinarily applied with a gravure coater. This method is one of the most accurate, but has the disadvantage of requiring different rolls for a wide range of coating weights.

Reverse roll coaters are by far the most versatile coating machines, both as to different coatings that can be handled and as to various weights possible. Matched, chilled cast-iron rolls ground to plus or minus 0.0001 in. in straightness and concentricity are the heart of the machine.

Hot-melt coatings, latices, varnishes, lacquers, organosols, plastisols, emulsions, vinyl solutions and many other coatings can be applied with this machine. Speeds range up to 600 fpm.

Of recent development are new polyethylene-wax and polyethylene-butyl rubber coatings that promise to make their mark in the packaging industry. Two methods of applying these new coating formulations are in use today. First, is extrusion lamination for the highly viscous materials and, second, is reverse roll coating for the less viscous materials that can't be applied by extrusion lamination.

The principal advantage of these new coatings is a cheaper cost without sacrifice of the packaging qualities found in polyethylene.

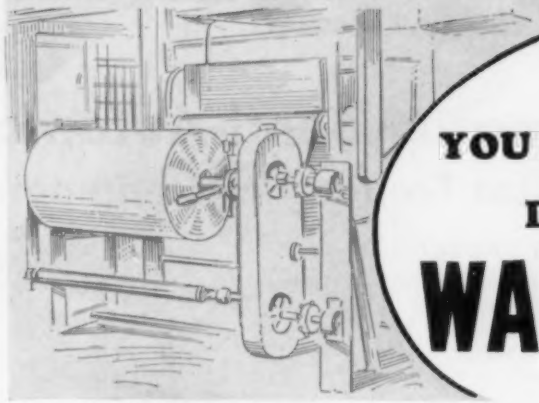
Laminators

Laminators can be classified into four general categories: (1) foil mounting, (2) board lining, (3) paper or paperboard laminating and (4) extrusion laminators. The various adhesives used include asphalt, waxes, starches, dextrines, latices, vinyls, lacquers and polyethylene.

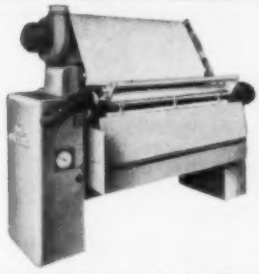
The essential components of a laminating machine are the unwinds (preferably constant tension), the applicator for adhesive coating, the combining section, the dryers and the winder.

The demand for better water-vapor-transmission characteristics in packaging materials led to the development of polyethylene and of the processes required to produce it in thin film form. The extruder head of a polyethylene extrusion laminator, as it is called, extrudes a film that is deposited on a web and is bonded by as much as 150 lb. per linear-inch pressure against a cold drum.

For MACHINE BUILDING Experience

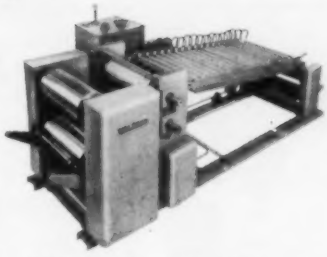


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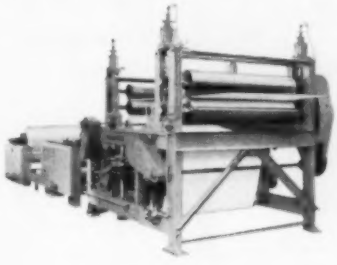
MICROJET* Air Blade Coater

In addition to this high speed machine, other types of WALDRON Coaters include: Roll, Reverse Roll, Hot Melt, Knife, Tower and others—for all purposes. *Registered Trade Mark



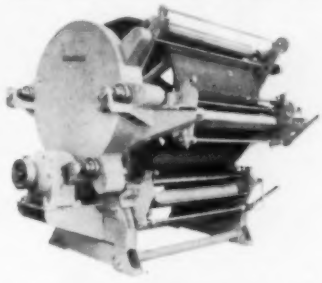
WALDRON Plastic Embosser

This machine is designed to accomplish all of the popular embossed effects. Many other types of WALDRON Embossers are available—pneumatic, hydraulic and mechanical.



WALDRON 2-Ply Laminator

A web to sheet Laminator Unit designed to laminate boxboard to greaseproof paper at speed of 500 f.p.m. There are WALDRON Laminators for Foil, Film, Paper and Cloth.



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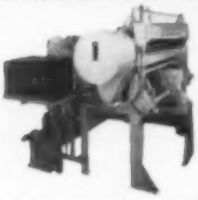
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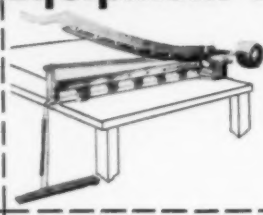
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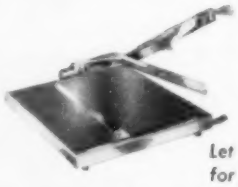
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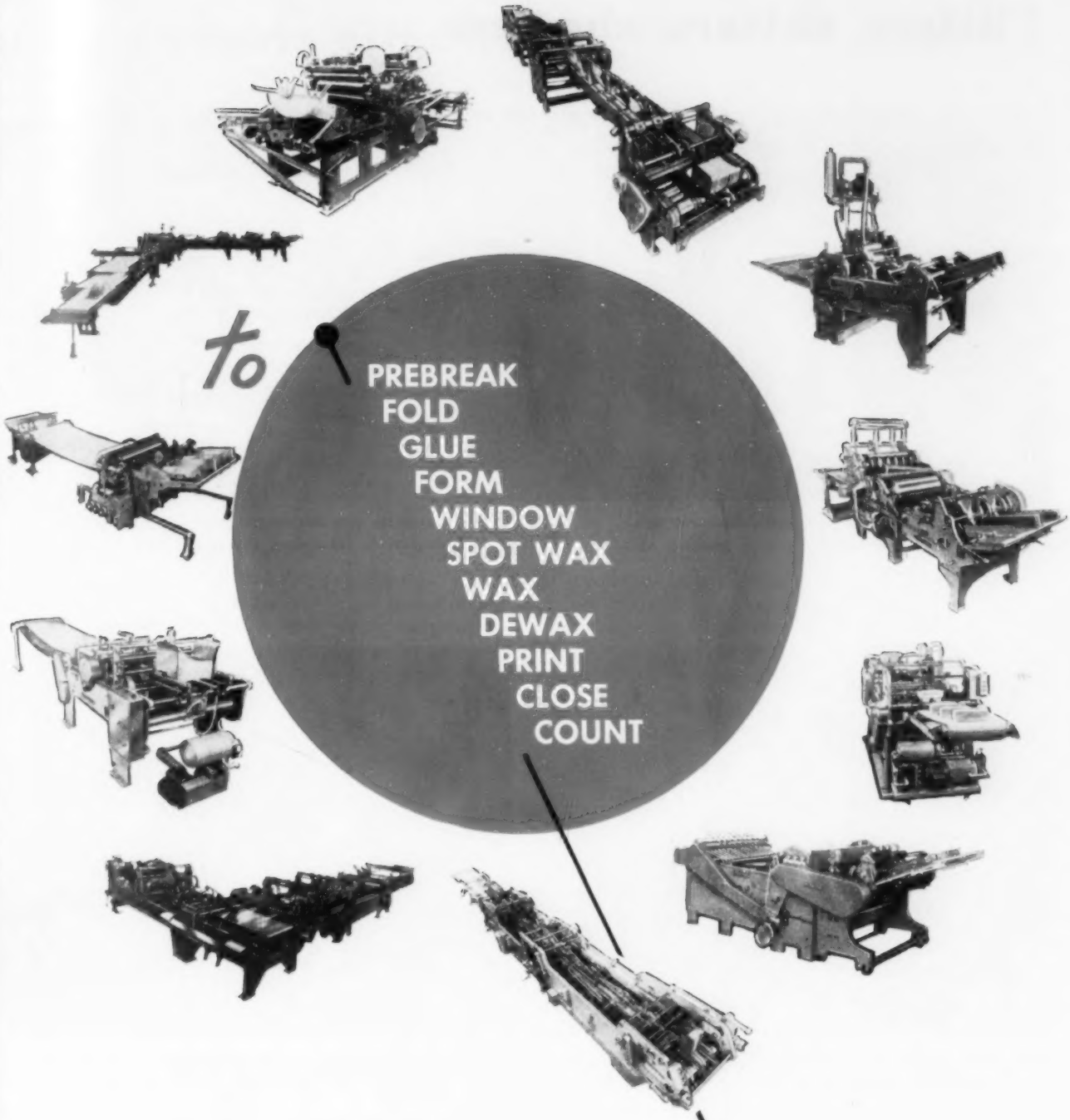
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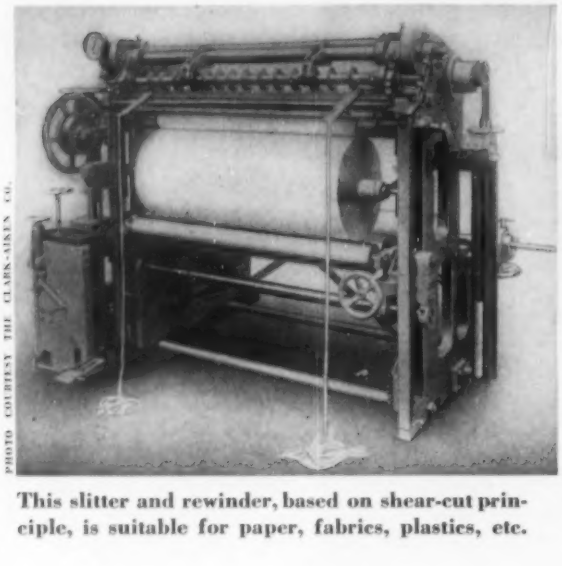


PHOTO COURTESY THE CLARK-AIKEN CO.

This slitter and rewinder, based on shear-cut principle, is suitable for paper, fabrics, plastics, etc.

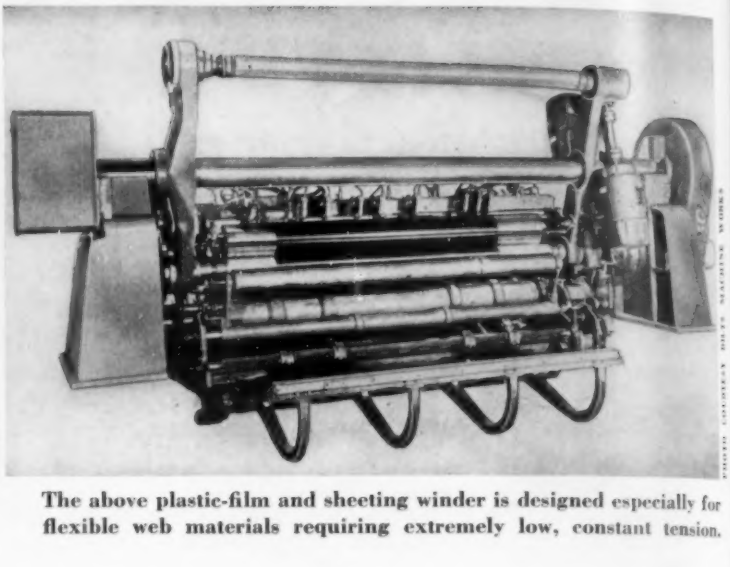


PHOTO COURTESY BEST MACHINE WORKS

The above plastic-film and sheeting winder is designed especially for flexible web materials requiring extremely low, constant tension.

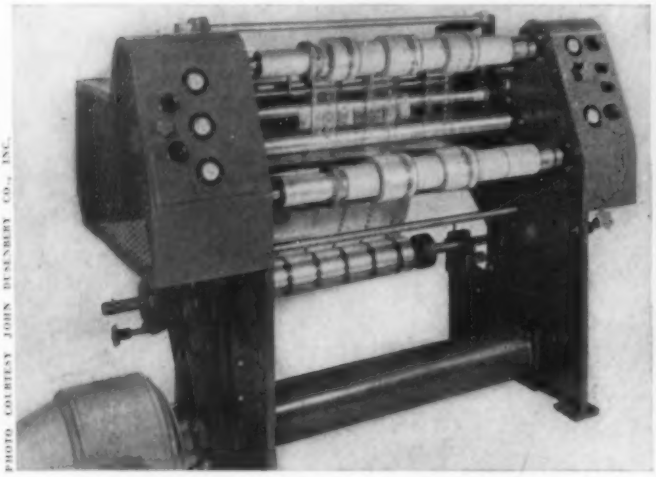


PHOTO COURTESY JOHN BUSENBERY CO., INC.

High-speed slitter and rewinder handles films, foils and pressure-sensitive tape at rates up to 500 feet per minute.



PHOTO COURTESY HARRIS-SEYBOLD CO.

Automatic spacer cutter cuts labels, wraps, cartons, etc., of paper, plywood, aluminum foil, plastic material, etc.

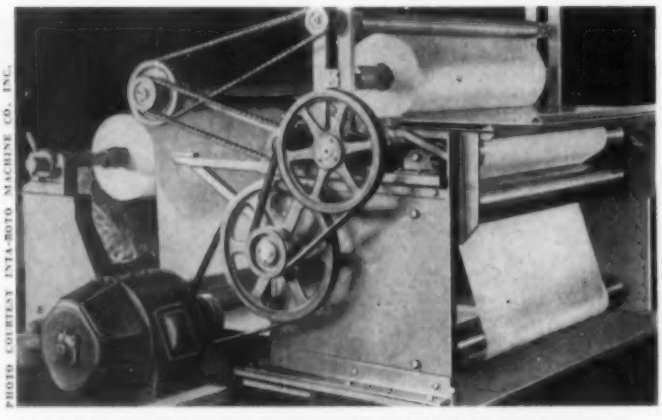


PHOTO COURTESY INTA-ROTO MACHINE CO., INC.

Belt-driven slitter assures registration for subsequent printing of films, etc., on multicolor, web-fed presses.



Sheeting and slitting machine for paper, cellophane and other materials makes 1,800 labels or sheets a minute.

Using gadgets effectively

by VICTOR C. HALL*

As gadgets are incorporated into packaging lines more and more, experience enables the packager to employ them with greater effectiveness and to establish certain standards of use. It is by using gadgets that the packager finds the ways to use them most successfully.

Among many considerations, the packager must concern himself with establishing some type of gadget shop, finding a gadget maker and providing adequate supervision for the gadget projects.

It may be wisest to set up a self-contained gadget shop instead of draining tools, equipment and personnel from the maintenance shop. Otherwise, it might mean loss of time for maintenance men or the tie-up of important machines vital to emergency repair and maintenance.

Gadget shops may be small, having only the basic tools and mechanized equipment, or they may be larger with more complex equipment. In addition to a machine shop, a testing laboratory may sometimes be required in order that the new devices may be tried out before they are integrated into the packaging line.

The extent of the equipment, however, is secondary to the qualifications of the gadget maker. A real gadget maker should be a combination machinist and toolmaker. He should be capable of setting up and operating any standard machine-shop equipment, making jigs and fixtures where required. He should have a working knowledge of heat treatment and be proficient in sheet-metal work. The latter is important, as most packaging and filling machines today must be shrouded both for appearance and safety requirements.

A gadget maker should be familiar with the various types of mechanical movements and know their applications and limitations, for in most cases, when a gadget request is presented, there will be no drawings available. A basic knowledge of electronics is also an advantage, as a great deal of the time required to work out complicated mechanical movements may be saved by the use of modern electrical instrumentation.

Finally, the gadget maker must have creative ability. Certain other requirements might be waived when a man with true creative ability is found. This talent is practically inborn and usually accompanies an inherent intelligence which will permit him to acquire the other skills he may lack.

It is also important to supply adequate supervision. At times a gadgeteer, if left on his own, will create a complex mechanism where a simple gadget might suffice. It is the responsibility of supervision to analyze each problem and come up with the correct basic idea and the method of procedure to be followed.

Since a large amount of stick-to-itiveness is necessary in development and gadgeteering work, many costly and unproductive hours might be spent incorporating fine adjustments on a machine or gadget which would prove to be too complicated for production. Supervision, therefore, must also decide when to abandon a basic idea or when to continue with it.

It is necessary to determine what requests for gadgets are practical. Some requests will carry definite ideas as to what the gadgets should be and how they should function. Others leave it to the gadget maker to create the idea, formulate the theory and produce the gadget. Among the devices that may be called for are those that add to existing machines or that convert a hand operation into a machine operation.

All gadget requests, however, cannot be fulfilled. Certain standards may determine the advisability of producing any gadget:

1. No gadget should be processed until a complete check has been made to be sure that it or a usable substitute cannot be purchased.

2. Costs and savings should be investigated. The complexity of a gadget's construction is usually determined by its pay-off period. One company attempts to keep pay-off below two and not more than three years.

In the case of a new product, savings may be indeterminate. In such instances, sales research can supply a sales estimate to help decide how great an expenditure is warranted. There are also cases where direct savings may not be the gauge. A gadget may be necessary from a safety or quality-control standpoint.

3. Industrial engineering should be consulted to determine how fully automatic a machine or gadget should be. A machine which requires three operators and a set-up mechanic is poor economy if the output of two hand operators is as great or greater.

4. If an automatic gadget is indicated, the services required for its operation should be determined—for example, electric power, compressed air, vacuum, steam, etc. It is possible that such installations would double the cost of a proposed gadget, making it impractical.

Other elements to be considered in determining the cost of producing a gadget are: design engineering; cost of materials; cost of building a model or prototype when necessary to prove a theory; actual machine labor required for construction; time required for testing and "debugging"; and instruction of personnel to operate the gadget.

Many of these costs can be estimated fairly accurately. Not to be underestimated, however, is the cost of debugging. This aspect of processing a device must be considered seriously, since the testing period may not only exceed original estimates in terms of money but in terms of time as well.

It should also be recognized that no small part of the success of a gadget lies in being able to "sell" it to the personnel designated to operate it. Many an excellent gadget has been lost to production for want of enthusiastic and comprehensive instruction of those who will use it.

When a study of all these factors indicates that the cost of constructing a gadget warrants the expenditure of time and money, then the actual work should begin.

If the packager observes the principles of evaluation and judgment suggested, he will probably find that gadgets can increase the speed and efficiency of his packaging line. Properly managed, gadget shops can and will pay substantial dividends. This has been increasingly the experience of those packagers who have added gadgets to their lines.

* Sharp & Dohme, Inc., Philadelphia, Pa.

GM-1000

The Laminator for Glue Mounting and Heat-Seal Laminating

FOIL

to Film, Paper and Board

- Laminating and coating, or coloring, or print treating, or endless design printing in one pass through the machine.
- Coating and coloring free foil or film for rewinding or heat-seal laminating.
- Drying system scientifically engineered for your particular requirements and utmost efficiency.
- Built on unit principle, additional combinations may be obtained, such as laminating both sides of web, die-cutting or sheeting in same operation.
- GM-1000 Standard units can be installed in your own machines for in-line operations.
- Complete machines fully guaranteed for a turn-key operation.

...and a complete Rotogravure Cylinder Service, too

INTA-ROTO
MACHINE CO., INC.
BYRD AIRPORT, RICHMOND 23, VA.

This is the Super GM-1000 Combination Laminating, Coating or Coloring Machine for glue mounting, heat-seal laminating or coating. A specially designed GM-1000 laminates board up to 40 point.



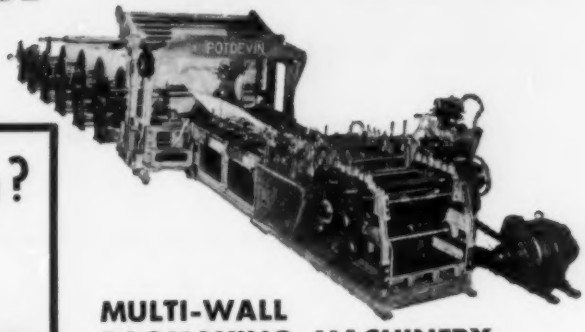
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THE SPECIALLY DESIGNED GM-1000 LAMINATES FOIL AND PAPER TO BOARD

POTDEVIN

PAPER CONVERTING EQUIPMENT

serving the packager since 1893

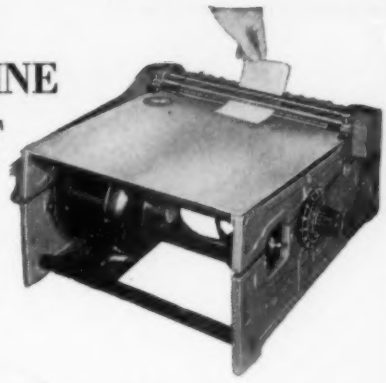


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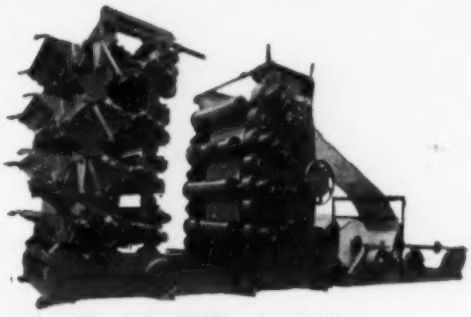


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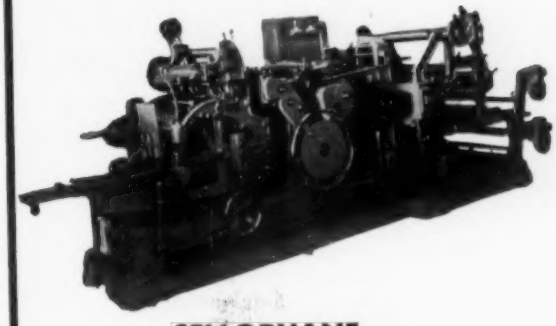
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Write for full particulars. Our engineers are always ready to help you solve any coating problems.



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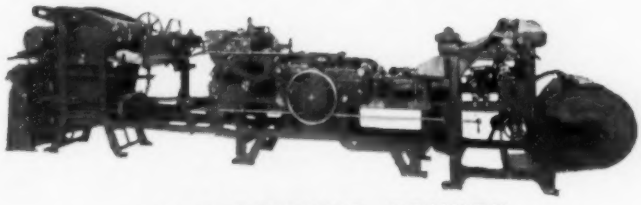


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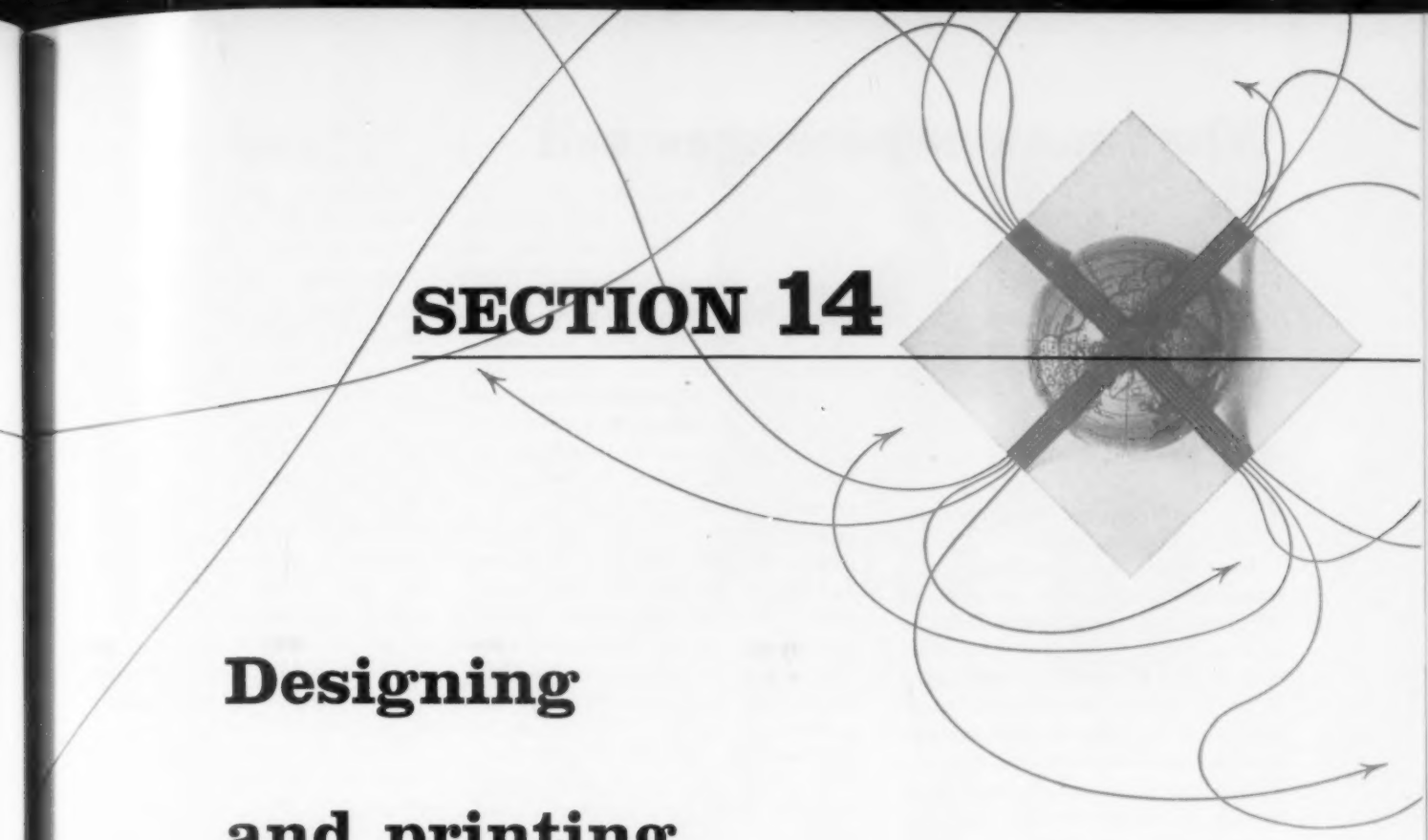
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SECTION 14

Designing and printing the package

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What makes packages sell

by OTTO NEUGEBAUER*

The proper ingredients subtly blended and served fresh make a tangy salad dressing, a smooth cocktail, a luscious cake. The same formula makes a good package, too.

The recipe for a good package includes impact, information and appeal mixed with a liberal portion of selling sense. Serve while brand new and watch carefully on shelf.

Impact, the first ingredient, is necessary to call the initial attention of the shopper to the package. This can be done simply in many ways by color, pattern, shape, size or a combination of any or all of these elements. In an attempt to be different, the package need not resound with garish colors or a bizarre pattern. All it need do is vary in a simple manner from the norm on the supermarket shelf by having an individual characteristic that lends personality. This characteristic personality will usually suffice in calling for attention, the first step toward a sale. A strong recognition feature, which is retained even when the package is changed, is one of the most common attention-getting devices.

The Taste o' Sea frozen fish fillets package (see illustration) is an example of a design that employs prominent recognition factors to create impact. The pure-white background lends emphasis to the simple diagonal three-element pattern of the design. The repetition of the three rectangular shapes is a strong, simple pattern readily recognizable. By natural sequence, the pattern leads the shopper's eye from the red name panel through the tempting illustration into the species panel. In redesigning this package, every effort was made to give it this strong pattern that tells the entire story in a glance.

The second important element in a good selling package is information. This should be concise, direct, unconfused by detail. When, for instance, a shopper is looking at a package in a freezer display case, she expects the contents of the package to be frozen and there is, therefore, no need to promote a time-worn phrase like "quick-frozen." If, however, the product does have a distinctive feature, it should be emphasized in proportion to its importance. Pre-cooked foods should be designated as such to distinguish them from those ready to cook. Many a customer has fallen prey to this packaging failure and brought home a package she thought was a heat-and-eat variety. Blame was placed on the packer and customer good will was lost. In a well-designed package, all descriptive copy is carried in an organized sequence and in relation to the size of package and design.

The illustration which is used to attract attention can and should be used also as an adjective. For, if it is full-bodied and expressive, it can eliminate the need for words by telling the product story by itself. To tell the shopper the story of your product with a process illustration, printing and reproduction should be of the highest quality. The illustration should be in good taste, using a setting that suggests use of the product in the home, with perhaps a suggestion of a unique treatment to inspire interesting methods of serving.

The Taste o' Sea package handles trade name and product designation simply, yet boldly. Since each designation is important, each has its proper emphasis in relation to over-all design and size of carton. The trade name is an adaptation of an older trade-name panel which has been simplified and strengthened to build trade-name recognition. Because the shopper is particularly interested in the kind of fish she is buying, the species designation has been given an emphasis equaling the brand name. All other copy has been subordinated to keep the package clean and simple while conforming to food laws.

Careful planning of the design resulted in an illustration of a fresh, hot-off-the-grill fillet with the creamy white meat of the fish showing through the crisply broiled crust. The dramatic close-up of a single fillet on a server, contrasting with the subordinated plate, lends a three-dimensional effect that draws the observer into the sphere of the illustration, making the shopper one with the package. The food on the server in the foreground heightens the effect of motion toward the shopper, eliminating the static feeling current in so many packages. The act of putting the package into a shopping cart then becomes an extension of the design's motion.

The first two ingredients of the package are the meat or the substance of it. The third, appeal, is the subtle, elusive ingredient which rounds out the package and gives it flavor. Appeal is the lasting quality of the design that retains freshness and interest under repeated observation.

* Art Director, Nashua Corp., Nashua, N. H.



Presentation of three major design elements in a simple diagonal pattern assures impact, information and interest.



Using a theme as effective as it is original, this symbolic design reaches into the emotions to say "Here is old-fashioned goodness."

The proper balancing of colors, design elements, type or lettering styles creates the atmosphere or appeal of the package. Just as different chefs prepare a dish with a slightly different touch, so a package should appeal with a clear, yet slightly different, flavor. Appeal is to design what the touch of garlic is to salad dressing, baking soda is to chocolate cake or vermouth is to the cocktail. Too much can ruin the recipe, as any chef knows. In the same vein, design that is too unique can smother the basic elements of the package and that delicate aura of appeal is lost.

Putting appeal into a package is a matter of understanding your buying public. As a rule, packages should not go into the realms of the extreme which might have an appeal to only a small, or caviar, segment. The appeal should be keyed to an average or beef-stew level which comprises the majority of the public.

Packages frequently can capture effect and appeal without the necessity of spending a lot of money for costly printing processes. This is not meant to imply that money spent on the highest skills and finest quality is not well spent. But every product and every market has limits on the margin of cost that can be allowed for packaging. Where staples are concerned, competition is usually strong and the margin of cost for packaging is limited. However, even within the narrowest limits, packaging design can still find challenging opportunities. For example, a warm, pleasantly homey atmosphere is created by the all-over calico background of a modern bread wrapper. A distinctive package results—one that is in good taste and free from "artiness." The theme is designed to appeal to most people because it is bright and colorful, yet homey.

There are innumerable sources for interesting attention-getting material. Very often the trade name suggests either a design pattern or a character which can be very effective on a package. The product itself sometimes makes a very good design element, especially if it has a characteristic shape or texture and, when used in the design, builds a mental association with the package. Regional designs, such as Pennsylvania Dutch or New England, have considerable perennial sales appeal.

A very effective use of a New England atmosphere has been created on the Cushman bread wrap, where the traditional trade name has been worked into a strongly colored oval for quick attention and subordinated designs depict a New England lighthouse and a covered bridge printed in gray and black. The illustrations emphasize the trade name and, at the same time, give length to the wrapper by drawing the eye out to the full width of the package. The entire feeling of the design connotes quality and an inherent goodness associated with the traditional New England virtues.

While it need not be the only approach to design, taste appeal is the keynote to food packaging. It goes without saying that quality is an essential ingredient of taste appeal.

Probably the most important factor in the sales appeal of a wrapper is its ability to fit into the proper channel. It must direct its appeal to the right people with symbols they can grasp readily and which have definite meaning to them.

A smart, sophisticated, modern design with abstract symbols may appeal to the caviar crowd and others who have been exposed to that kind of atmosphere. But, unless your product is aimed at that level of buyers, it is far better to introduce design symbols that will be understood by all levels. This may be called "corn" by some. It is necessary to feel out the buying public in the area where you sell and build your design around the tastes of the majority.

To summarize, a package will sell if it has initial impact by being bright, strong, simple; if it conveys its information concisely, simply and clearly, and if it has lasting appeal through good illustrations or visual symbols that are pleasing and are easily comprehended by the shopper.

Slowly but surely many forces are changing the tastes of the public. This is evident in home building, interior furnishing, automobiles and, of course, in many consumer products and packages. But the motives and influences that make people buy remain quite basic. The package that learns, by new methods or old, to take over the old-fashioned art of selling—arousing desire, giving needed information, assuring reliability, suggesting pride of ownership, offering good value—that is the package that answers the question, "What makes packages sell?"

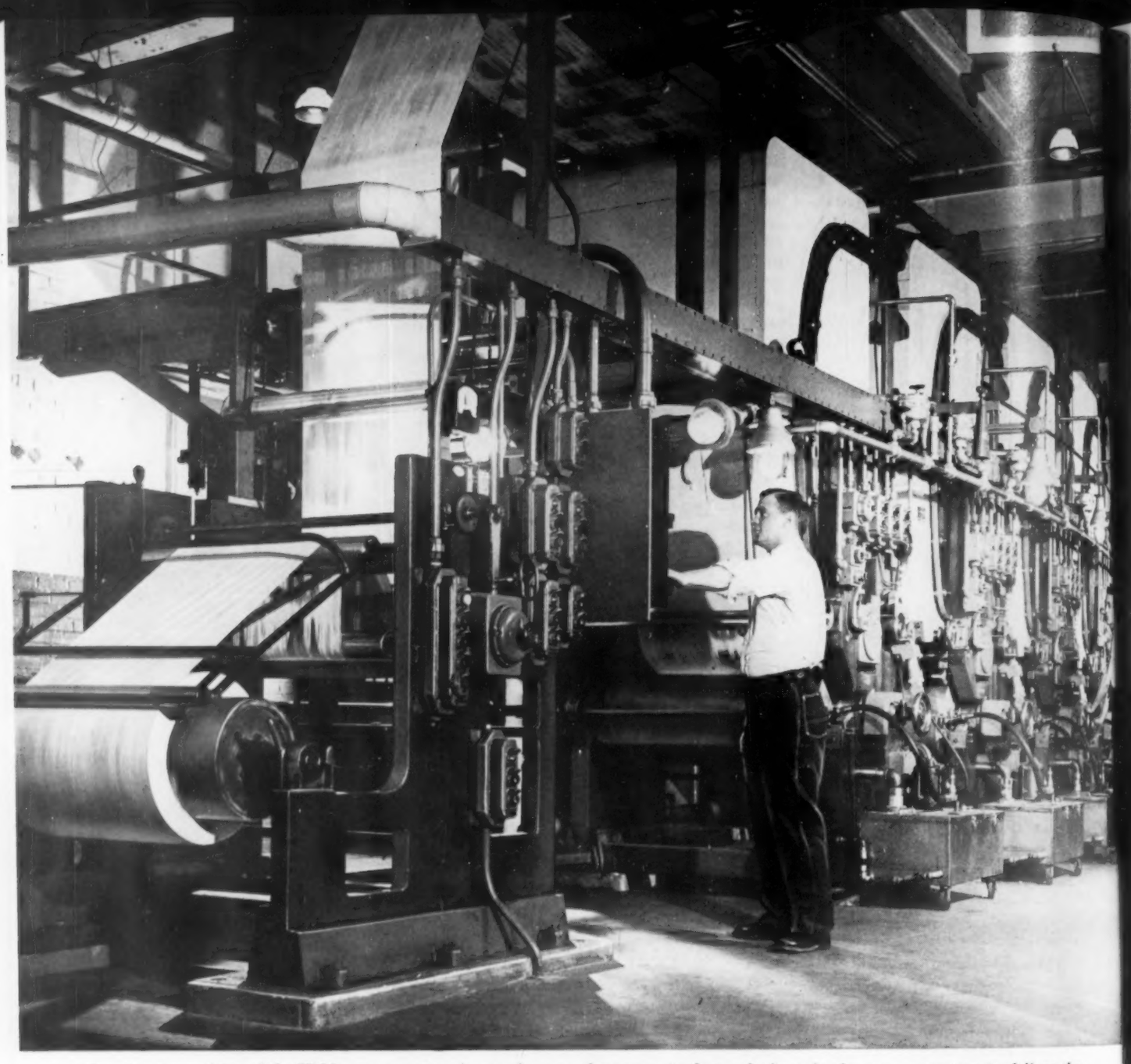
DESIGN, RAYMOND LOEWY ASSOCIATES



Many factors are required to make packages sell. One good approach, as demonstrated in this beautiful gift decanter, is creative design, painstakingly conceived, pre-tested and expertly executed.



Packages with a friendly or familiar look are excellent sales producers. This famous mouse has been bettering sales records for 16 years.



Complete Accessibility of the Kidder gravure press is one of many advancements that make it easier for your operators to deliver the top-quality results *you* want.

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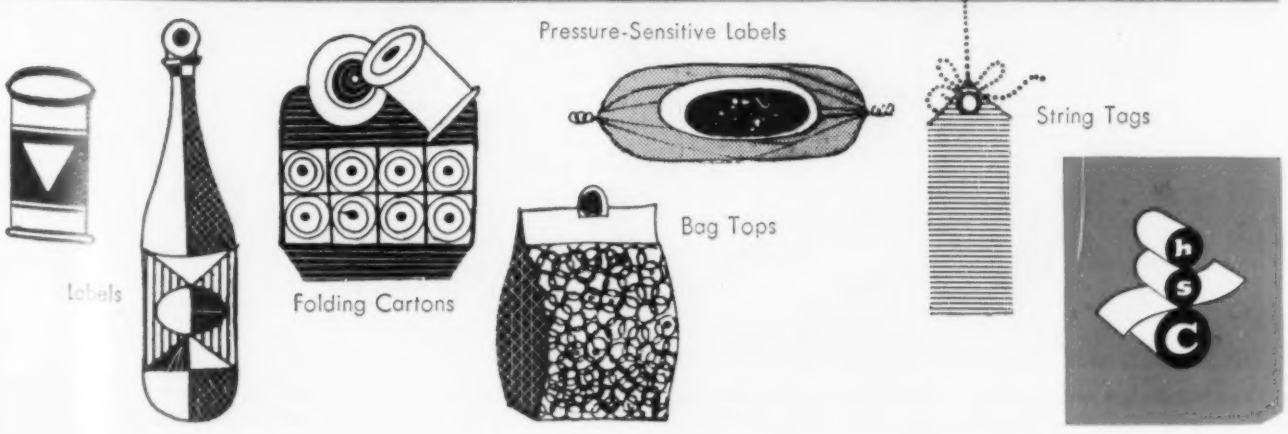
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Designing the package

by JAMES GISONDI*

The ultimate purpose of designing package surfaces is to promote the sale of merchandise. Packages are required to protect the products they contain but they must also indicate what is inside, usually in a manner to command the attention of the shopper and make the product attractive enough to sell on sight.

Some packages inadvertently camouflage their products when placed alongside competing packages, whose color, type and illustration make more arresting combinations. Some packages actually confuse shoppers.

The design approach to folding cartons, labels, tins, shipping containers, etc. is much the same, except that each form has its own physical limitations. The creation and delivery of a successful package is a triumph of teamwork. It represents the many people whose cooperation is necessary to bring a container or label from the designer's drawing board to the retailer's shelf. A package may be compared to the wheel whose spokes work in perfect coordination to support the hub. If one spoke breaks, the whole wheel is weakened and proper performance is jeopardized.

A careful analysis of marketing conditions is of primary importance for a practical approach to package design. In this way, the best methods and possibilities for merchandising the manufacturer's product can be determined. Preliminary discussions with the manufacturer are needed to gather information about the product and where and how it is to be sold. Regular visits to retail stores will enable the designer to gather additional information on actual methods of product merchandising and promotion.

An effective package design evolves in the designer's mind as a synthesis of many ideas. Often he must reconcile requirements that appear to be in conflict. When he completes the design, however, there are reasons—either of a merchandising or production nature—for every detail that comes together in the final integrated whole.

Because of the many competing brands on supermarket shelves and department-store counters, the designer is faced with the task of producing a package so compelling that shoppers will of their own accord select it from among the many brands veritably shouting for attention. For this reason beauty alone is not a prerequisite for effective merchandising design. Effective packages are simple, pleasing to the eye and easy to read. This implies control of the visual sequence on the entire package surface so that the printed matter will convey the message accurately and quickly to the shopper.

The human eye seldom focuses for long on one point in a design. Rather it flits back and forth from one element to another in haphazard sequence, unless the design is skillfully arranged to force its orderly progress from one idea to the next. A vital part of the designer's job is to make sure that the eye sees first things first, that it dwells as long as possible on areas of special importance such as brand and product name or special features.

The effectiveness of a package design must be predicted with reasonable accuracy before it appears on the retail market. In recent years a great deal of guesswork has been eliminated by the development of a scientific instrument for the purpose of testing layout, color, type face and illustration. It is possible to test the legibility of copy matter and the length of time required to absorb the message. Other factors can also be pre-tested, such as impact of the package design, the meaning of illustration or other elements and correctness of copy sequence for proper order of assigned importance. The manufacturer can be assured that

*Package Design Dept., Container Corp. of America, Chicago.

PHOTO COURTESY THE LORD BALTIMORE PRESS



Creative design and skilled multicolor reproduction are teamed up to produce tempting realism for packaged mix.



Elements contributing to success of Halo package are sales appeal, visibility and identification.



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A Division of Sun *Chemical Corporation*

GPI **General Printing Ink Company**

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PHOTO COURTESY REYNOLDS METALS CO.



Striking evidence of how a standard material can find new jobs to do in packaging is found in the successful introduction of printed foil wraps for soap.

when his package is displayed it will command the shopper's attention.

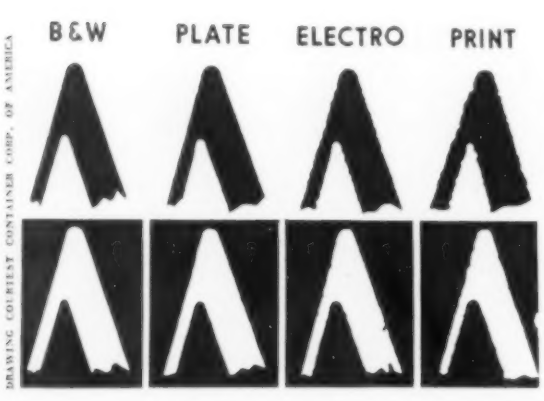
Size is both a physical dimension and an optical impression. In terms of relative size the visual effect of the package can adversely affect sales. It is known that some companies gain sales because their competitor's package appears smaller, even though the cubic content of both packages is the same. Optical illusions can be controlled to enlarge or reduce the apparent physical size of the package for consumer acceptance. To illustrate, an over-all blue carton tends to reduce the apparent size of the package but an over-all yellow carton of the same size will appear larger.

To illustrate further, a certain package had a band of color that ran horizontally across it from score to score and covered approximately a third of the upper area of the carton. At the extreme lower portion another band approximately half an inch wide also ran horizontally from score to score. Between the bands appeared an illustration of the product coupled with descriptive copy. The visual effect produced was of three horizontal bands, which optically tended to shrink the physical height of the package and also to weaken control of reading sequence.

To correct this optical impression, two simple changes were made on the engravings. The first change was to trim ⅛ in. of color from both sides of the upper band. By so doing the horizontal direction of the band was transformed visually into a vertical direction, which in turn made the package appear appreciably higher. The second change was to trim ⅛ in. from the top of the lower band. Psychologically this helped to define the bottom edge of the package. The identification values of the original design were preserved, but the eye was compelled to travel up and down the package as well as across it.

Sometimes well-designed packages, when considered individually, seem effective enough to do a selling job. However, when arranged in mass display they fail to live up to expectations. Perhaps the designer has failed to check on what happens to his design elements when packages are displayed in quantity. Effectiveness in mass display is an important objective of package design for any product that is likely to be sold in the modern self-service store.

For example, the geometrical arrangement of the design elements of a package created the illusion of two distinct cartons. When displayed in a group of six packages, the visual appearance was that of 12 small packages. The total effect was misleading and utterly confusing. After a downward trend in sales, a new design approach was recommended. The aspects of both physical and visual components were coordinated into a pleasing, simple design that, when mass displayed, become integrated without sacrificing the identity and physical dimension of the individual package.



DRAWING COURTESY CONTAINER CORP. OF AMERICA

Drawings illustrate the various stages of reproduction from original art work to final print. Because there is a progressive loss of sharpness, consideration of printing surfaces and process limitations is necessary for fine, high-fidelity reproduction.

Color

Color is one of the shortest visual paths to the emotions. It arouses a strong response long before the printed message can be absorbed. Expertly used, color separates the package from its surroundings and indicates the type and quality of the merchandise. The colors on a package should express the special characteristics of the article contained–a feeling of cleanliness, of elegance, or of strength and durability, of coolness or warmth, depending on the customer reaction desired.

Color preferences often vary with age and sex differences. Pastel shades generally have feminine appeal, subtle hues ranging from medium to deep tones have masculine appeal, while children respond to bright primary colors.

For these reasons color plays an important role in present-day merchandising. Package color is no longer a matter to be settled by the manufacturer's or the designer's personal preferences. Its function must be taken into consideration and an objective decision made on the basis of actual package performance.

The choice of colors that separate the package from its surroundings will command attention in display with its competitors. Recently a relative visibility test was made of 14



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The products shown are only a few of the many types of printing that can be done on a New Era Press.

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NEW ERA **Manufacturing Company**
371 Eleventh Avenue, Paterson, New Jersey

ILLUSTRATIONS THIS PAGE COURTESY CONTAINER CORP. OF AMERICA



Visual Impact Tester compares effectiveness of package identification.



Anglemeter indicates angle at which package features lose their legibility.

competitive brands of coffee packaged in 1-lb. tins. Twelve packages were predominantly red in color. The relative-visibility meter indicated only a slight variation in the reds which was difficult to perceive with the naked eye. Individual identity was thus obscured—all the coffees looked alike except for two tins, one of which was predominantly blue and the other green. There was no difficulty in quickly noticing and identifying the brand of the blue and green containers under simulated merchandising conditions.

The use of an excessive number of colors for reproducing process illustrations can make for poor economy and loss of quality. To illustrate, a manufacturer of woolen blankets merchandised his product in a carton featuring a full-color illustration that covered the entire package surface. A loss in fidelity of reproduction by the use of seven colors resulted in a misrepresentation of the merchandise. The illustration did not carry out the soft, luxurious appearance of a high-quality woolen blanket but rather gave the coarse look of a low-quality cotton blanket. By simply eliminating three of the colors used, the designer immeasurably improved the reproduction of the product and at an appreciable saving in cost. It is not only economical but practical to employ the least number of colors needed for proper reproduction.

On the whole, too many packages on the market today have little or no color distinction, making repetitious use of the red, yellow and blue commonly seen on all retail shelves. This ignores the resources of the spectrum and the distinctiveness obtainable through contrast, say, of two unusual shades of two common colors. Many such combinations may be had at no greater printing expense than would be incurred for the standard color combinations.

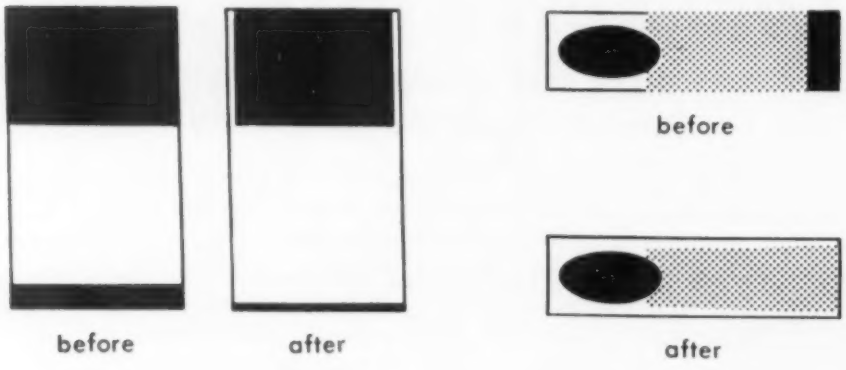


Figure 1



Figure 2

Influence of optical impression on package size is demonstrated by varying individual design elements in figure 1 and by altering physical dimensions without changing the cubic content of the respective packages as indicated in figure 2.

Coordination of packages

Layout and color coordination between primary packages and corrugated shipping containers provides better product identification and makes use of the larger container to reinforce trademark, brand and product message. The designs of the retail package in general cannot be copied literally but must be creatively adapted to the limitations of the plates for corrugated containers and the printing of them.

The paperboard shipping container is becoming known as a "five-sided billboard," because its top and four sides are like billboards where colorful, poster-like designs provide arresting reminders of product, brand name and trademark. Used this way, the container design achieves style and originality along with the more limited value of an identification tag, for it is as easy to reproduce a good design on a shipping carton as it is to print "This end up."

Two-color printing offers much greater possibilities for attractive design than one color. Because most corrugated and fibreboard containers are printed on two-color presses, the difference in cost between one color and two is slight. The designer should strive for a light, open design so that the printing plates place a minimum of pressure on vital corrugations. On solid-fibre containers a greater freedom in the use of detail is possible, since clearer impressions can be secured by the use of metal plates. As a

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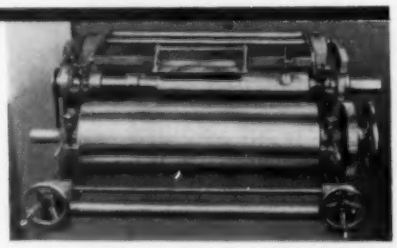
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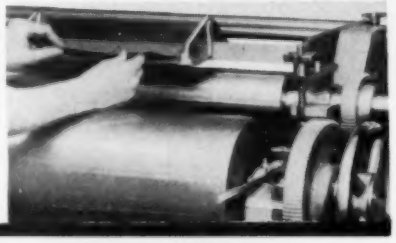
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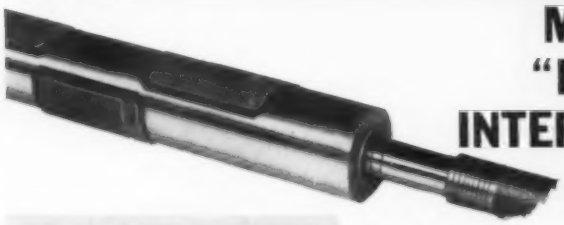


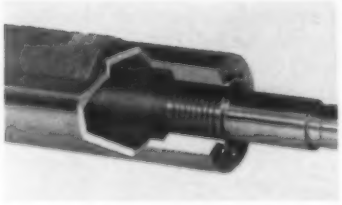
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Visibility tester determines legibility of the package under varied conditions.

general rule, designs on solid fibre should avoid excessive ink coverage because ink penetration is slow and offset presents a problem when the flat printed blanks are stacked one upon another.

The designer should anticipate production problems such as close register and the overprinting of one color upon another, especially where two-color equipment is used. It is also important to avoid printing which travels around the corners of a fibre container. The designer should always consider the whole carton in utilizing its surface. The sides adjacent to the central design panel should be treated as related components of the design.

Type, expertly used, relates the product to the needs of the shopper. The selection of lettering or type face is of great significance. It must quickly and concisely convey brand and full product information. The eye should be directed to follow the printed message in a logical sequence in order of assigned importance to convey the strongest sales message possible.

Let us suppose that a Roman face has been chosen with characters that have certain strokes and serifs which are very light in weight. Let us further assume that in the black and white drawings, clear, sharp lettering strokes were rendered. The engraver must exercise care in etching the plates to prevent undercutting so that he can hold the fine lines of the letters within the technical limitations imposed by the engraving process itself.

(*This article continued on page 554*)

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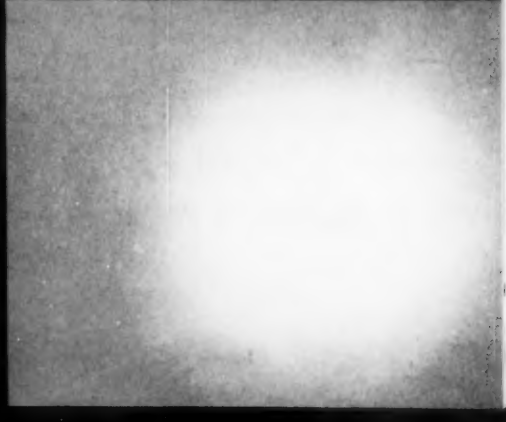
FILL IT..





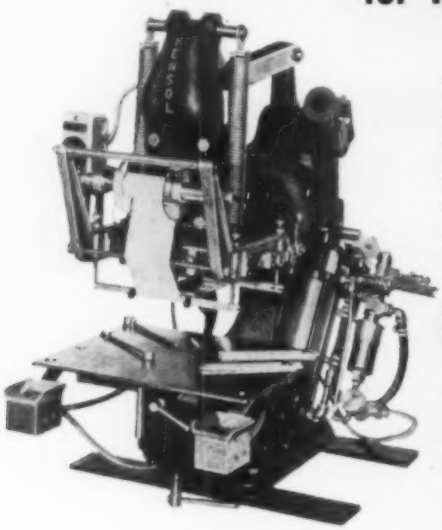
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What housewives look at is recorded in sequence by the Ocular Movie Camera.

Upon close examination of the printed proofs, however, the clear sharp strokes that were rendered in the drawing and which the engraver tried to retain in the plate may appear rough along the edges. Because of the necessary steps such as the duplication of plates, ink transfer, etc., that must be employed for a production run, these ragged edges have possibilities of becoming progressively worse. Therefore, when choosing a Roman face, whether for type or hand lettering, it is more practical to select one in which the light strokes and serifs of the letters are somewhat weightier, perhaps a Garamond, Century or School Book. Sans-serif type faces, which are available in many styles and weights, have excellent engraving and reproduction possibilities. All these suggested type faces are practical for use in reverse or positive printing.

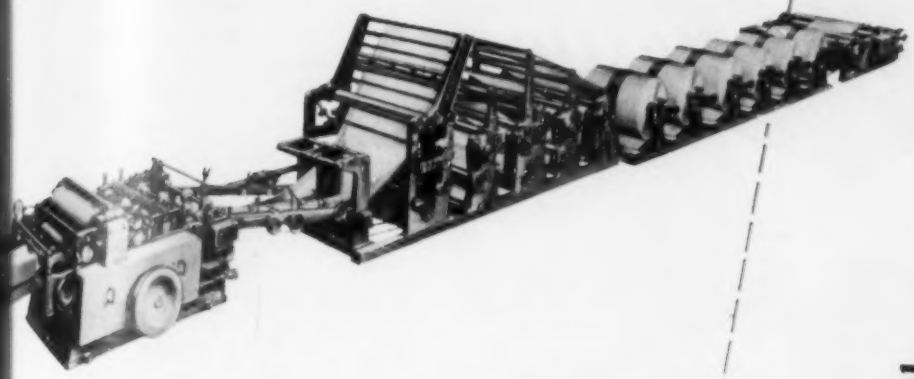
Illustration

Sales appeal of a product is increased by good illustration. This can best be achieved when the photography or artist's illustration is of high quality.

Color illustrations of practically all types of merchandise have been reproduced remarkably well on all kinds of package surfaces. There is no single best medium of rendering an illustration of a product for good reproduction. However, certain food products, such as ice cream, cakes, pies and some vegetables, lend themselves to photography, while others such as cookies, cereals, candy and certain fruits require some type of artist's

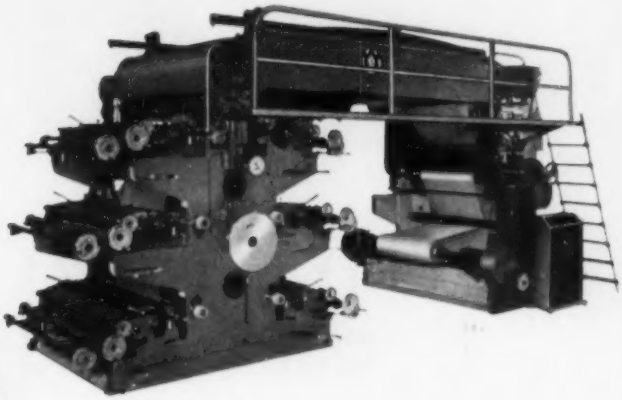
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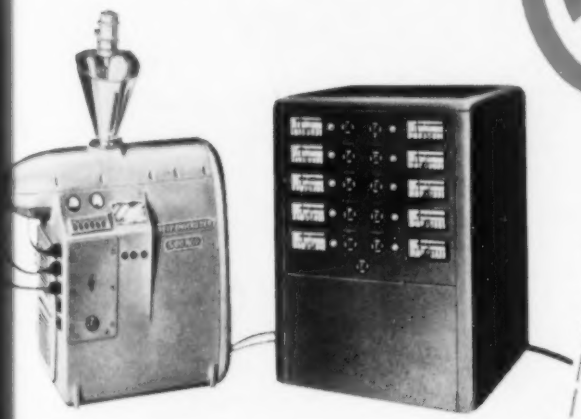
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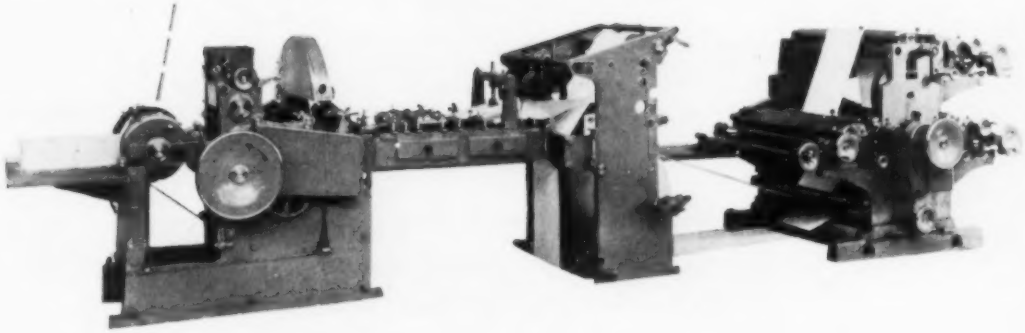


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work to give them the optimum appetite appeal.

There are many special kinds and grades of paper and board stock. Not all types and grades used for packages or components are suitable for multicolor printing. Of those available for folding cartons, to take an example, white patent-coated and clay-coated boards are extensively used for process printing because of the clean white surfaces.

Production requirements and mechanical problems of printing both limit the selection of half-tone screen values for process reproduction. The limitations are greater for letterpress than for offset lithography. The differences lie in the methods of engraving and in the application of ink to board stock. The designer must decide what printing process will reproduce the art work in question to its best advantage.

Fidelity of reproduction is dependent in good measure on proper color rotation. On the printing presses to be used for the production run, it is advisable to pull proofs in several orders of rotation to determine the order which seems to result in the most faithful reproduction of the original illustration. Otherwise, improper rotation may lessen considerably the effect of good plates and printing in the final package.

Design check list

For an integrated approach to his package surface, the designer must ask and find answers to many different questions that will affect surface treatment:

1. Nature of product and type of protection required
2. Materials and form of package construction
3. Production requirements
4. Sales advantages, limitations
5. Competition
6. Merchandising environment
7. Consumer groups at which the product is aimed
8. Color
9. Mandatory copy (including brand, trademark and other essentials)
10. Illustration, if any, and method of reproduction
11. Family design relationships
12. Limitations of printing and engraving.

Thus, a successful package will perform each of many functions as a well-integrated unit.


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The printing arts

The techniques and skills of the graphic arts industry well serve the many needs of packagers—meeting widely varying demands for reproduction on all types of packaging materials and rising to the challenges of the search for better package printing.

Because so many skills and techniques are involved in the graphic arts and because performance demands in package printing afford so many challenges, the selection and use of the various methods is truly a matter for experts. The following discussions are therefore intended chiefly as an introduction to the characteristics and uses of the various processes employed in printing and decorating packages. Included in this section are articles dealing with letterpress, offset, rotogravure, flexography (aniline), silk screen, decalcomania, embossing, roll leaf and printing inks. The reader is also referred to the articles on p. 384, "Marking Glass Containers," and "Marking Plastic Containers," p. 296.

Letterpress

by A. C. Zettlemoyer*

In the letterpress process, printing ink is transferred from raised metal onto paper, board or film. The oldest method of mechanical printing remains the most widely used in packaging, although it has been losing ground steadily to the flexographic and gravure processes.

The advantages of letterpress printing that enable it to survive and indeed to make progress in package printing can be enumerated, but there is no universal agreement on any such listing. The most prominent advantages of letterpress are strong solids, most brilliant colors, relatively easy color control and sharp, clear-cut details. Furthermore, the demand for high-gloss prints is easier to meet with letterpress. In addition, letterpress printing must still be considered the most flexible process where changes and corrections are involved and, generally, in developing continuity with the other steps producing the finished package.

Other printing processes have made significant inroads into the packaging field, in large measure because of the slow-drying characteristics of letterpress inks. For long-run jobs like soap or detergent containers and can labels, an additional limitation is plate wear.

The use of steam-set inks (which dry by precipitating resin from solution when in contact with water—from a spray or in the stock itself) has reduced odor and toxicity problems and has led to continuous printing and fabricating. While such inks provide the answer for food packages, the improvements in efficiency their use makes possible are not sufficient for all fields. Steam-set prints characteristically lack gloss and are not too good on rub resistance. However, they lend themselves well to wax coating and the increased use of milk, butter and ice-cream cartons has pushed forward the use of steam-set inks on packaging materials.

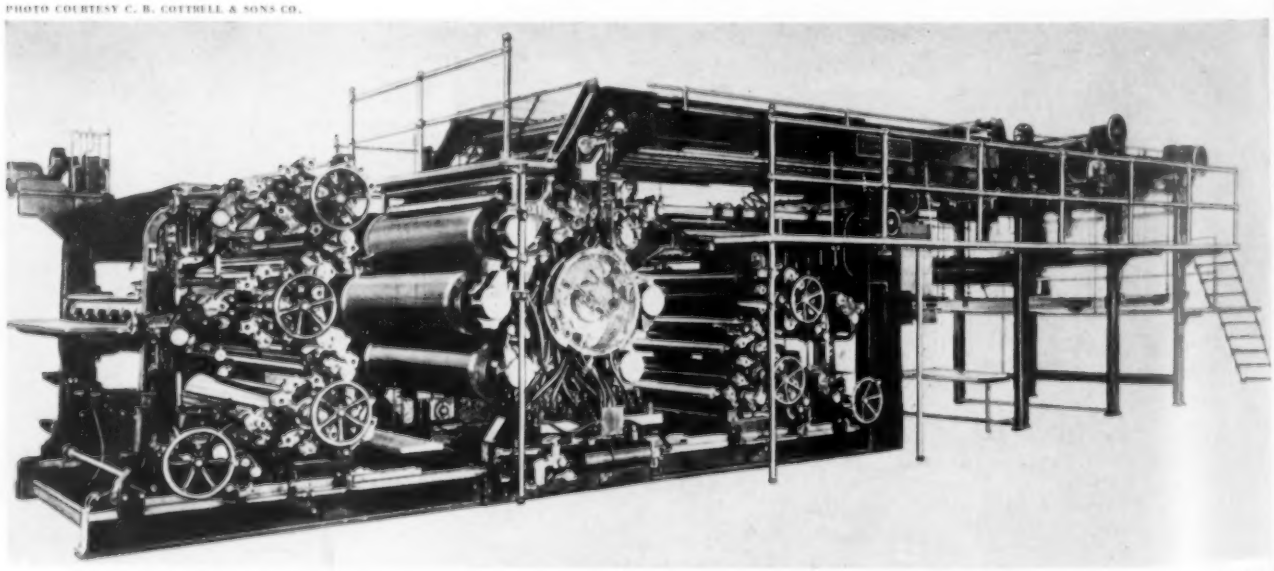
Heat-set inks (which dry by burning or volatilizing off the solvent) obviously cannot be used on most synthetic films or on boxboard. Color control and brilliancy are also not of the best. Nevertheless, gloss heat-set inks have been successfully developed for printing such materials as coffee bags on web-fed presses. Combinations of heat-set and the usual oil-based inks and other so-called quick-set inks have resulted in faster drying inks which have made considerable progress in letterpress printing and helped get printed cartons through the manufacturing process more rapidly.

In general, recent advances and trends in letterpress printing of packaging materials have emphasized more color,[1] more gloss and better rub resistance. Competition has become keener and consumers of packaging materials are striving to design and

* Research Director, National Printing Ink Research Institute, Lehigh University, Bethlehem, Pa.

[1] See "The Trend to Fine-Screen Printing," MODERN PACKAGING, June, 1953, p. 99.

PHOTO COURTESY C. B. COTTRELL & SONS CO.



Cartons or labels printed by letterpress exhibit: strong solids, high gloss, brilliant colors and clear-cut details. In addition, the process offers relatively easy color control, flexibility for corrections or additions and variety in selection of inks.

obtain such high print quality that the package will "walk off the store shelf." Thus, users of packaging materials have stepped up demands for permanency, brightness and resistance to the product packaged.

Mechanically, new innovations have been offered the producers of packaging material from all sides. Development continues on in-line units to produce a finished package from the printed stock. Innovations have also been made in the design of presses to reduce make-ready time and to increase flexibility in plate size and the like.

Broadly speaking, however, all these recent improvements in the letterpress printing of packaging materials are not basic, do not reflect any new understanding of the factors and variables involved. This ancient printing process is plagued by a lack of fundamental research in years past. There is great need of basic studies such as have now been initiated by graphic arts research institutes throughout the world on make-ready, ink receptivity of paper and the flow properties of ink.

Thus, letterpress printing has not moved forward to higher levels of print quality and greater production economy with sufficient rapidity to prevent inroads into its bailiwick by other processes.

Until recently, for example, there was no method available to print reproducibly from day to day. Such variables as printing pressure, speed of printing and make-ready have not been brought under control in pressrooms, paper or ink plants. Recent work has shown how these variables can be brought under control, at least in the laboratory.

A brief objective description of print quality might help the purchaser of packaging materials to recognize the problems involved in definition. Experimentation and development work in printability of ink, press and paper are meaningless unless print quality can be defined and unless objective methods of quantitative evaluation are found. Although print quality is judged daily by many individuals, it is difficult to define.

Print quality is the aggregate effect of the various appearance characteristics of printed matter. The quality must be determined by comparison with an appropriate standard or objective. A number of possibilities have been used or suggested for this standard: the image on the plate, the original copy, the effect the customer has requested and even the psychological effect on the observer. No agreement has been reached.

CARTONS, WALDORF PAPER PRODUCTS CO.



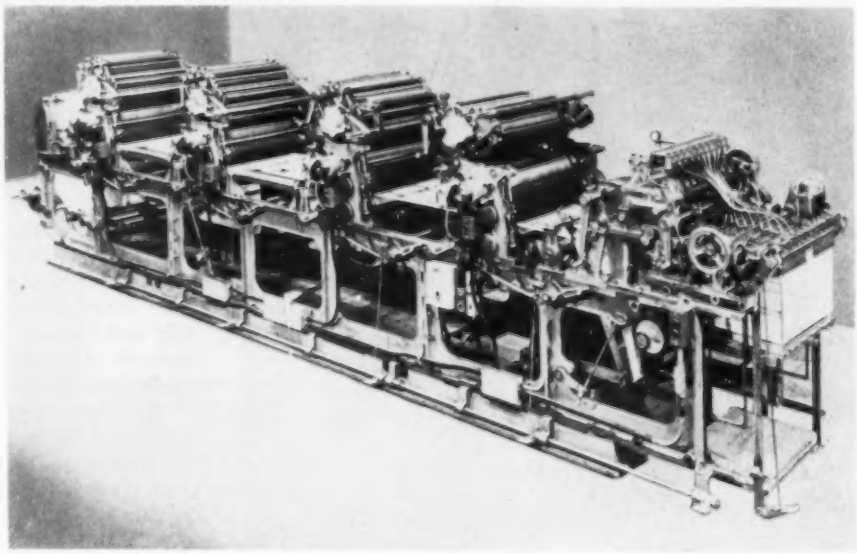
Two forms of printing are combined in this carry-home carton so that the best features of each are exploited. Two-color letterpress lends distinction to the signature panels and the sporting illustrations have made use of the excellent color effects possible with four-color lithography.

Consideration should be given, however, to the individual properties which make up print quality. These properties are most conveniently analyzed when they are classified into those of primary importance in printing solids and those which arise in half-tone work.

Solids and type matter are generally characterized by appreciable stretches of continuously printed areas and readily discernible boundaries between printed and unprinted areas. The most important appearance properties encountered are color, gloss, uniformity, sharpness of outline and print-through.

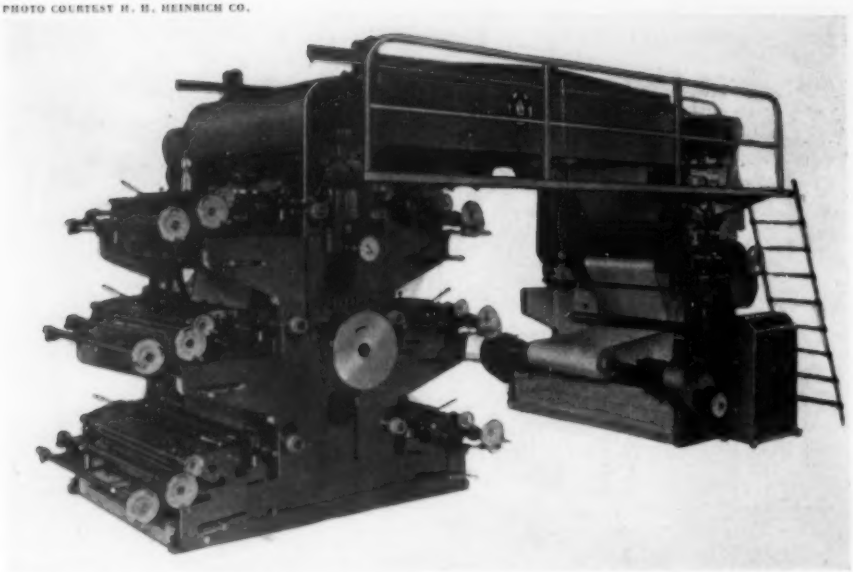
The problems of measuring color are quite complex. No measuring instrument has been found universally satisfactory and the best models available are expensive and cumbersome. With the growing trend toward glossy prints, it must be emphasized that gloss is a psychophysical attribute of

PHOTO COURTESY JOHN WALDRON CORP.



Four-color offset press can deliver high-speed black and white or multicolored process printing; can print wet, dry or wet-and-dry offset.

PHOTO COURTESY H. H. HEINRICH CO.



High-speed flexography is most economical and popular process for multicolor linework of continuous runs of cellophane, plastic films, papers, etc.

a surface for which no unified concept has been expressed, although several instruments have been devised that yield useful measurements. Sharpness of outline and uniformity have not yet been measured satisfactorily for comparative grading.

The problems involved in the numerical evaluation of solid prints are not nearly so complex as those met when dealing with half tones. The reproduction of pictures is the most difficult and time-consuming phase of any printing process. Two characteristics of the original must be reproduced—tone values and contrast. Tone value is the integrated density over a half-tone area and contrast is the sharpness of detail.

A great deal of art is involved in tone value in obtaining both the highlights and the proper contrast and the shadows. Often a compromise must be made in order to give the printed illustration a proportion of each. Indeed, it is a combination of craftsman's skill and good fortune when contrast and tone values correspond with the original. This lack of quantitative control is a handicap to efficient production, since a delicate balance between contrast and tone must be maintained through many steps.

Recognition of these problems should enable the consumer of packaging materials to work with the producer more effectively.

PHOTO COURTESY BENSING BROS. & DEENEY



Close-up of printing unit on flexographic press shows how the transfer and form rollers distribute ink from fountain and how cellophane web receives impression as it passes between the rubber printing plate and the cylinder.

Offset Lithography

by Charles C. Rossotti†

The printing surface of lithography is plane—neither raised like the letterpress nor below the surface like intaglio or gravure printing. The principle of lithography is based on the simple fact that oil and water do not mix. The printing area or image is photographed on a sensitized metal plate which is then treated in such a way that the image accepts printing ink, whereas the areas not to be printed will repel the greasy printing fluid. This is brought about by moistening the entire plate with water. The water, applied in a thin film on the plate area except for those portions which will receive the printing image, prevents the ink from adhering to the nonprinting surface.

In actual operation the water roller coats the entire plate with moisture before the ink roller comes in contact with the plate. After the plate is inked, the image is transferred from the plate cylinder to a rubber blanket, which then revolves over the paper, which in turn accepts the image. The latter process, because it does not print directly on paper, is known as "offsetting"; and the term is used interchangeably with lithography.

Plates are prepared by photographing the copy and other material to be reproduced. The result is a negative which is placed in a frame over a thin sheet of grained or roughed metal that has been sensitized. Exposure to an arc light hardens the emulsion only in those places representing the printing image. The unexposed emulsion washes off, leaving only the image. The plate is wrapped around the cylinder of the press, a rotary machine.

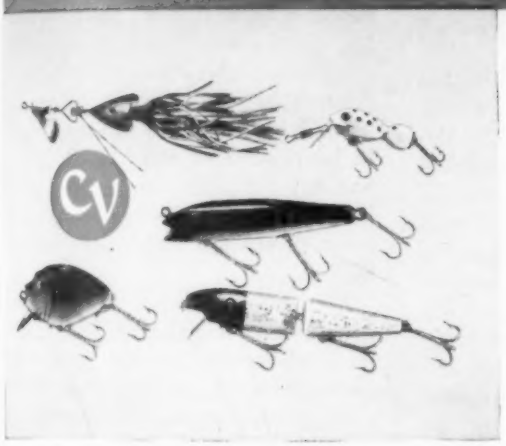
Today, offset is especially advantageous for printing cartons, labels and wrappers that bear full-color reproduction. Due to improved methods in photography, especially by the direct-color method, reproduction by lithography provides more sharpness and better detail than ever before. A four-color system has been perfected comparing favorably with work

† Rossotti Lithograph Corp., North Bergen, N. J.

Another SGS FIRST*... and the RESULTS...



*FIRST separation negatives for a gravure carton ever made direct from subject. 20 fishing plugs were used for 4 different carton designs.



Above — The decorative plugs just as they were recorded by the camera's sensitive eye and reproduced in realistic coloring by the gravure cylinders of SGS experts.

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Fishing for results? Read on! Famous CHAMPAGNE VELVET BEER had the idea for a "fisherman's" beer carton. Gaylord Container Corporation's designing staff went to work and after sketches had been approved, turned the production over to SGS. The results are pictured above.

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SGS are not printers and have no financial interest in any printing firm



Left — Part of SGS's quality equipment — the versatile Klimsch Camera — in action . . . our first step in producing the eye-catching cartons shown at top of page.

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INCORPORATED
POST OFFICE BOX 1641 • LOUISVILLE 1, KENTUCKY

CYLINDER, MOSSTYPE ROLLER CO.



Man shows demountable rubber-plate cylinder sleeve for flexographic work as contrast with heavier conventional cylinder resting on floor.

that formerly took eight to 10 colors.

The cost of four-color work is comparable with one- and two-color costs of some years ago. Improvements include standarization of inks; high-speed presses which handle sheets up to 54 by 76 in.; low-cost papers, paperboard and offset stocks; combination runs through multiple images; and economies in photography and plate making, as well as in the preparation of original art work.

One of the most important advantages of lithography from a cost standpoint is a minimum of make-ready (preparing the form for printing). An offset press plate is the equivalent of a typographic form locked up and made ready. Thus, a large multicolor press can be readied in hours rather than days. An offset press plate can be stored for rerun without the expense of breaking up a form and subsequent duplication of lockup and make-ready.

For mass production—long runs in the millions—it is customary to use deep-etch plates employing multiple images. These are provided by step-and-repeat machines or photocomposing machines which position the multiples to a thousandth of an inch at a cost per "step" (equivalent of an electro) considerably less than the minimum electro charge. Often, for small-size labels, the camera produces a multiple-unit negative for as many as 100 units, or dozens of different jobs may be composed on a large plate.

The flexibility of the process permits corrections in color and text in a short time. There are limitations, but on many occasions corrections have been made on plates, although remakes of plates from negatives take surprisingly little time. New techniques in obtaining color separations photographically, along with short cuts in color corrections, have speeded up the process of getting the plates onto the presses. The same art work in different sizes can be handled without duplicating color correction costs.

Brief mention should be made of the versatility of lithography in relation to paper surfaces. Inexpensive, rough-surface, uncoated stocks can take process color and fine half tones up to 300-line screen.

Flexography

by James J. Deeney*

Conservative estimates indicate that more than 10% of all printed packaging today is produced by the flexographic (formerly called "aniline") process. And, in the field of flexible packaging—bags, wraps, etc.—the total percentage is considerably higher.

The flexographic printing process dates back to 1890, but its real development as a quality graphic process has come about only within the last quarter-century. It was introduced to this country via Germany in the 1920's primarily as a low-cost means of combining the printing and manufacturing of ordinary paper bags in a continuous operation.

But it was the introduction of cellophane as a packaging material that marked the beginning of flexography's popularity. The then new film presented a difficult problem to other printing methods. Oil inks would neither adhere nor dry properly. However, flexographic inks could and did. Today in addition to cellophane, flexography is used for printing glassine, tissue, sulphite, kraft and other paper stocks; aluminum foils; cellulose acetate; boxboard; polyethylene, Pliofilm and other plastic films. Its colorful reproduction is seen everywhere on bags, wraps, box coverings, folding cartons, gift and trademark wrappings, corrugated shipping and display cases, paper cups and containers, counter roll stock, even on labels for cans, jars and bottles.

The economy, versatility, quality and relative simplicity of the flexographic process are its major strong points. It enables a roll of material to be printed in a continuous web, either to be rewound or to be fed directly to converting machines. Because of the fast-drying inks used, as many as six colors can be printed on the web in a single pass.

Coupled with flexography's high rate of printing production and its adaptability to hard-to-print surfaces is its ability to reproduce extremely brilliant colors. The resilient rubber plates used on flexographic presses afford clean reproduction of fine type matter as well as uniform printing of large solids. This is true whether printing is on rough, grained stocks or on slick, nonabsorbent materials.

While some good process-color reproduction is being achieved with flexography, it is best suited to printing designs with line detail only. The exceptional color effects achieved with flexography are best exploited by using large masses of color in designs to be printed by the process. When half-tone or Ben Day shading must be reproduced, it is best to confine them to screens that do not exceed 80 line.

Flexographic presses range in size from those designed to print 1-in.-wide ribbons up to the 12-ft.-wide jumbo webs. Most presses used for package printing, however, are made for web widths between 26 and 54 in. Today's presses print at an average speed of about 300 ft. a minute, with cellophane run at somewhat lower speeds and paper up to 600 ft. a minute. Press speeds may vary between 100 and 1,000 ft. per minute.

One outstanding feature of the flexographic press is its employment of interchangeable, removable plate cylinders within a wide range of diameters. This enables a single press to be used economically for printing both small and large package forms. It also means that make-ready is not required. The plate cylinders are prepared before they are installed in the press, so down time is minimized.

Rubber plates are secured to the plate cylinder by pressing them down on a sheet of two-way adhesive previously wrapped around the steel cylinder. At the end of the run they are easily removed and filed away for future use. Sometimes plates are furnished with adhesive backing. Since the ability to perform the plate-mounting operation outside the press is one of flexography's big advantages, the

* Bensing Bros. & Deeney, Philadelphia, Pa.

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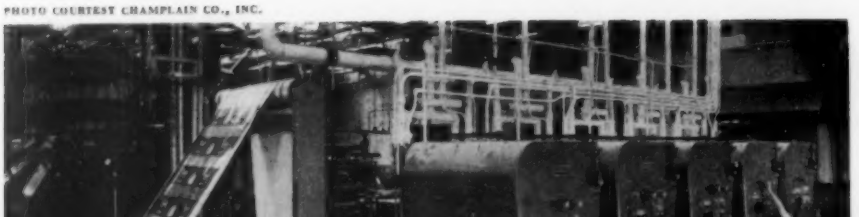
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Rotogravure process teams quality, fine-screen reproduction and practicality for long runs in printing tags, labels, fancy wraps, etc.

cylinders are often prepared in special machines designed both to simplify the mounting in accurate register and to deliver advance proofs.

A recently developed demountable-sleeve cylinder[1] has the rubber printing plates permanently vulcanized to its surface. The sleeve containing the plates can be removed and stored for rerun and is particularly suitable for uncommon reruns, where as few as 500,000 impressions may be needed at one time. Cost is less than half that of conventional cylinder without plates.

In addition to precision methods in molding the rubber plate, plate quality depends to a great degree on the pattern engraving from which it is molded and the black-and-white art from which the engraving is made. Since the plate must be curved around a cylinder, it is necessary to introduce carefully calculated distortion into the art work to compensate for the rubber shrinkage factor and the elongation resulting from plate curvature. Also, the nonprinting subsurface of the engraving must receive the same attention as its printing surface. Unless the engraving is etched extra deep, without undercut or ragged side walls, and cleanly routed right up to the side walls, the rubber plate will lack the necessary sharpness.

Good flexographic printing depends on a combination of many factors, not the least of which is the degree of teamwork between the printer and his inkmaker. For, unless the inkmaker knows all the facts about a job, he is unable to formulate the one best ink to meet its requirements. Therefore, it is always best to consult the inkmaker during the preliminary planning of a job and give him the facts he needs.

The following is offered as a check list for your inkmaker:

1. What kind of stock? Submit a sample to the inkmaker of the material you intend to print. Make sure this sample is identical with the make, type and grade you will use.

2. What special properties must the package possess in view of its end use? Must the ink be sunfast? Odorless? Impervious to alkaline or volatile substances? What product will be contained in the package?

3. Will the material be rewound after printing or fed directly to a bag machine, waxer, sheeter or other converting machine? Will it be waxed—single or double—heat sealed, corrugated or otherwise processed after printing?

4. If the stock is a transparent film, will printing be done on its face or underside? Will the design be backed up by a solid color, and if so, will this backup or (in the case of face printing) base color be white or some other color?

5. What is the planned rotation for laying down colors if it's a multicolor job?

6. Specify colors clearly by submitting a color sample on the specified stock to be used.

[1] See "New Flexibility in Printing," MODERN PACKAGING, April, 1955, p. 172.

Rotogravure

by Arthur Fred Goat*

This process employs a plate or cylinder with a design etched below the nonprinting surface. The method is usually referred to as *intaglio*. When stock is sheet fed and a flat "strap-on" printing plate is used, the process is referred to as *gravure*.

Rotogravure is a roll-fed rotary printing method and the use of material in rolls will afford economy of handling and frequently a price advantage over sheeted stock, especially in quantity lots.

Rotogravure inks are fluid and fast drying, which allows for the printing of any number of impressions in one operation and at high speeds without danger of offset or smudge.

The ability of rotogravure to print dry permits the placing in line with printing units such specialty equipment as rotary embossers, perforators, coating and lacquer applicator units, and rotary or reciprocal cutting and creasing equipment. The operation of such equipment in conjunction with printing units can substantially reduce production costs.

Printing by rotogravure requires less skill than offset or letterpress due to the elimination of make-ready and washup and use of a simple ink-distribution system. Distributor rollers are not required, as in letterpress, nor is water adjustment, as in offset. Printing from a subsurface area of varying depth closely controls the volume of ink laydowns, produces a wide range of tone values and maintains color consistency in solid areas. Intermediate tones can be produced from as many as 15 different etch depths in one cylinder.

Rotogravure printing cylinders are more expensive than offset, letterpress or flexographic plates, but their actual cost is not a major prohibition to the greater use of rotogravure. More serious limitations are the time required to obtain cylinders from a commercial plate house and the difficulty of adequately proving plates except on a production press.

This is modified where the produc-

* Vice President in charge of sales, Champlain Co., Inc. Bloomfield, N. J.

ing plant has installed its own plate-making equipment, as is the practice with large gravure printing and publishing firms. However, the cost of the equipment and the need for skilled technical personnel does not make this practical for many users.

The application of commercial rotogravure can be considered practical for the printing of virtually all materials. Such commonly used packaging components as paper-backed foil, glassine, sulphite, cellophane, Pliofilm, kraft, label stocks and a variety of paperboards are printed by the process in the production of tags; labels for cans and bottles; box wraps for frozen foods, baked goods and candy; fancy and gift-wrapping papers; and containers and cartons for frozen foods, soap, eggs, ice cream, etc.

One of the first considerations in specifying gravure printing for a package or package component is quantity, for gravure is not suited to small runs. But when quality is essential in quantity printing, rotogravure is not only eminently practical, but also allows great flexibility in package design. In addition, the process has established clear-cut superiority in large-run printing of films and foils, particularly for the faithful reproduction of art work and full-color illustrations.

Silk-Screen Process

by J. J. Grossman†

Silk-screen printing has expanded its field in the last few years—first because of its immense versatility, second because its uses have become more widely known, and third because of improved materials, methods and equipment. To the packager, silk-screen-process printing offers these points of versatility:

1. It can print on a great variety of surfaces, smooth or textured, dark- or light-colored papers, wood, cloth, plastic, metal, glass, paperboard and corrugated board.

2. It can print on already formed surfaces, i.e., plastic or glass bottles, packages or boxes of wood or other material which may be formed before being printed.

3. It can print perfectly opaque white and light colors, silver or gold on black paper or other dark surfaces. Enamels by silk screen are especially beautiful.

† Masta Displays, New York.

PHOTO COURTESY PROCESS SCREEN MFG. CO.



Silk-screening device available in different sizes can process names, figures, designs, etc., on cylindrical glass and metal containers.

4. Small runs for test purposes or for large quantities are both practical and economical.

In general the packager should consider silk-screen-process printing for jobs which stray off conventional paths or seem to be "problem" jobs. Silk-screen-process printing will print on almost any surface.

Users of silk-screen-process printing include the following:

Cosmetic manufacturers use silk screen for box wraps printed on foil, wood grain, flint and other highly calendered surfaces, metallic papers and board. Designers of packages to be silk screened are constantly on the lookout for imported or domestic papers different in color, texture and design.

Bottlers of soft drinks, milk or perfumes have their glass or plastic containers printed by silk screen.

The color used in silk-screen marking on glass is not an ink but is a paste made from "frit" glass—a lead borosilicate glass melting at somewhat lower temperature than the flint, amber or green glass used for bottles. The color substances are ground very fine until they form pastes of a consistency that enables them to be forced through the apertures in a screen. Both heavy and light color applications can be made. However, fine-detail reproduction is difficult in multiple-color work because perfect register cannot be guaranteed.

Silk-screen printing of counter or floor display merchandisers of natural jute or pre-colored corrugated board displays is an ideal use of the process.

Silk screen is also effectively used in printing the vivid daylight-fluorescent colors appearing on packages and labels, especially those produced in shorter runs. Sleeve wraps for A & P and Unity tea bags have been printed with daylight-fluorescent colors. These pigments achieve maximum brilliancy by silk screen because of the heavier layer that can be applied.

Improved materials, methods and equipment for silk-screen printing include:

Inks that dry more rapidly, adhere to any surface—in high-gloss, satin or flat finishes. Inks with high "build-up" or of very little thickness.

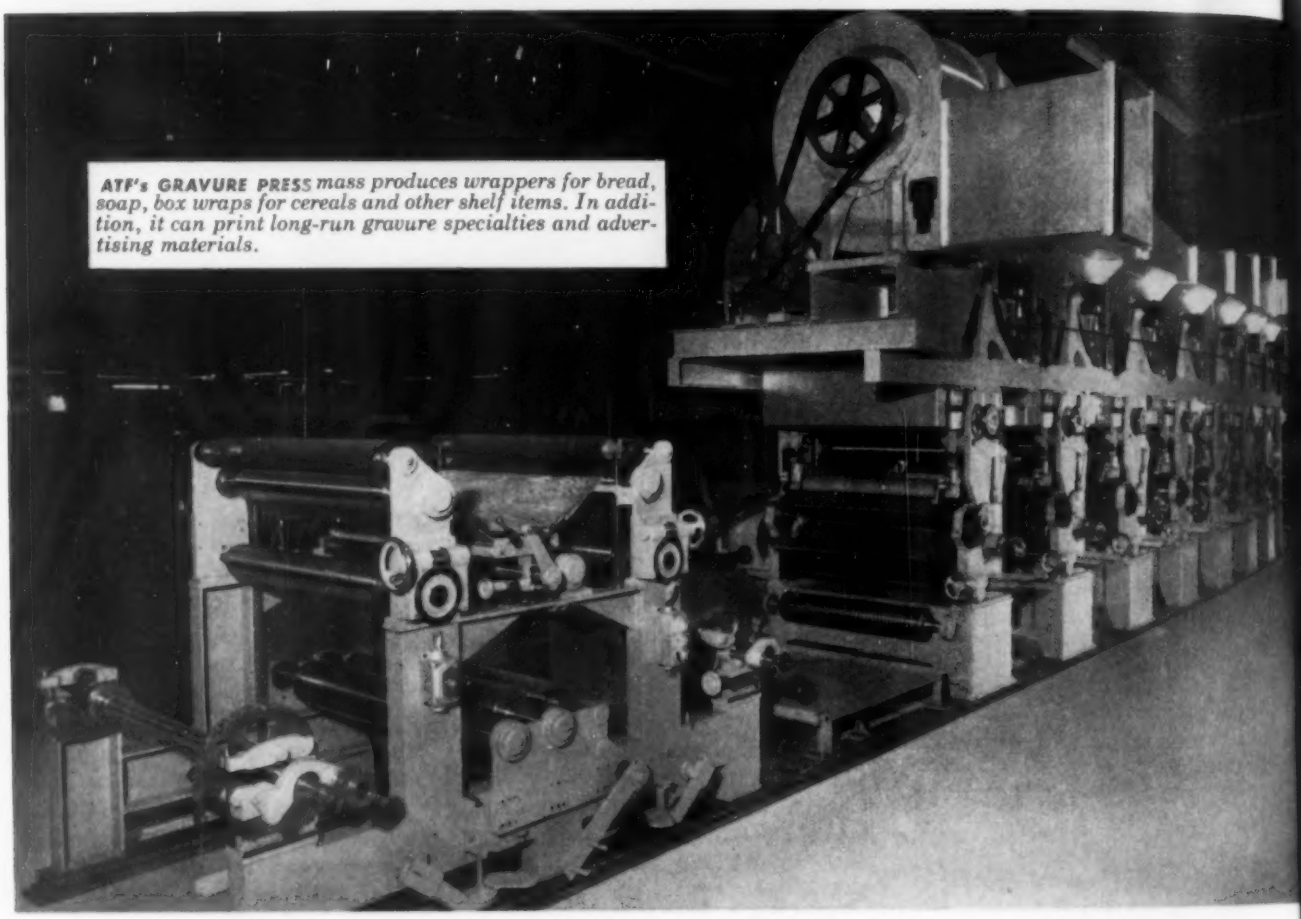
Drying equipment to speed production. Silk-screen printing for the most part is racked for drying. This consumes time and requires space. New equipment will dry printed stock so that it can be stacked shortly after registration at the end of a conveyor.

Machines for rapid production are in use. These include flatbeds for printing rigid materials and rotary presses for more flexible paper and paperboard.

Newest methods of making silk screens reproduce finer detail and smaller type. Half tones should be kept below 85 line. Where half tones

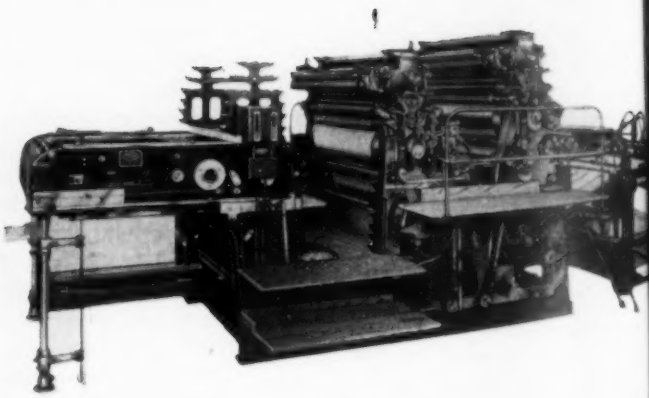
(*This article continued on page 568*)

can your presses meet today's packaging printing requirements?



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If you'll look around a supermarket sometime, you'll realize that more and more money is spent every year on packaging printing. You can capitalize on this trend for steady, profitable, volume business if you have the right equipment to handle it. ATF makes an extensive line of presses... letterpress, offset, gravure . . . to take care of a very wide range of package printing needs, both large and small. It would pay you to look into the ATF presses and equipment that give your plant the flexibility to do packaging work at a *price* . . . and at a *profit* as well.

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For printing a wide range of wrappers, inserts, foil for box and bag wraps . . . ATF ROLL-FED OFFSET PRESSES. Where shorter runs using different sets of plates are desired, the speed, ease and economy of plate-making and make-ready, simplicity of operation of ATF Roll-fed Offset Presses make them extremely effective for printing many different kinds of packaging materials.

For printing heavy labels, paperboard cartons, carton wraps, gummed and special stocks . . . ATF SHEET-FED OFFSET PRESSES. This type of press is practical for even shorter runs than roll-fed offset presses, and especially suited to trial runs, experimental package printing, and custom work. ATF offers the most comprehensive line of sheet-fed offset presses to meet any packaging need, ranging from a sheet size of from 14" x 20" to 43" x 65", with the only sheet-fed offset press printing both sides of the stock, and taking sheets up to 38" x 53½".

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In new process, decal (top center) transfers printed matter to bottle. Unlabeled bottle at left receives decal with supporting lacquer film, which causes label to adhere. Film is removed by firing, leaving label fused into bottle surface.

are needed much finer, it is advisable to do a combination job, using letterpress or offset for the half tone and silk screen for the remainder.

The silk-screen printing industry has gained stature in recent years with the formation of the Screen Process Printing Association, International. The purpose of this organization is to disseminate information to the industry and to users of screen-process printing about new and better methods and applications.

Decalcomania

by Ralph Royer*

The decal transfer has come a long way in the past 10 years. It has proved its ability to tackle and conquer tough, complicated assignments —involving in many cases problems that defied solution in any other way.

Decalcomania can be described as "painting by press." Actually decalcomania is a transferable color film carrying a printed message or design. This film is removed from its protective paper backing and applied to a surface to become a permanent part of that surface.

Depending upon the surface to which it is to be applied, decalcomania is affixed with varnish or cement—or, more generally, it is immersed in water and then applied.

Today the manufacturer of decalcomania is constantly confronted with new and previously untried applications for his product, particularly as new commercial surfaces and new basic manufacturing materials are introduced. The rough or "crinkle" surface offered a particular challenge which was met and mastered. The development of plastic products with their smooth, nonporous surfaces also presented a challenge.

A few of the larger decal-transfer manufacturers maintain laboratories to adapt decal to new materials. One of the largest decal producers has found a way to apply his decal transfers to rubber, either by cold application or in the mold. During World War II also, much naval and marine equipment found its way to the tropics. A special fungusproof decal had to be developed.

Automatic application

Thanks to a new type of decal and the development of proper machinery, automatic application of colorful decal labels is now a reality.[1] Heretofore, decals were generally hand applied.

The advantages of being able to use decal transfers in mass-production labeling are obvious. The very nature of decals provides desirable improvements in labeling appearance and superiority of adhesion. Decals make possible the use of multicolor pictorial and open lettering combinations with perfect register of color.

The practical development of machine-applied decal transfers opens up a completely new phase of glass label decoration. One manufacturer of cosmetic preparations has already adopted automatically applied decal transfers to label his entire line. While matching the speed of paper-label application, he has achieved vastly improved package appearance.

Decal transfers enable the manufacturer to use—in one application—as many colors in his label as he desires. There are none of the limitations of direct screening. It is technically feasible to use a dozen or more colors in the label. Equally important is the fact that the machine application "locates" the transfer perfectly on the product in the exact position.

The first decals to be applied automatically were not permanently fused to the bottle, but were protected by a lacquer coating. They would not stand up under hot-water washing. Recently a new type of decal employing ceramic inks has been introduced.[1] The decal is applied to a heated bottle and the heat releases the lacquer-coat backing, thus transferring the decal to the bottle. The bottles are then conveyed into a lehr (oven) and are baked at temperatures up to 1,150 deg. F. for about an hour. This fuses the label to the glass surface.

Roll-Leaf Marking

The roll-leaf marking operation is basically simple. A roll of leaf or foil is fed across the face of a heated die and with each operation of the press the design or lettering is stamped or embossed into the surface.

Roll leaf comes in rolls of convenient lengths, in exact widths as required, in a wide range of colors including gold and silver. For simple marking operations a small hand press is sufficient. Large production runs require fully automatic presses. In either case, the roll-leaf marking may be fitted into the user's packaging production line.

Paper box tops and wraps may be embossed with roll leaf on a platen press fitted with a roll-leaf feeding attachment and a heating plate. The roll-leaf design is transferred and embossed in a single press operation.

Labeling and trademarking. Flat and curved surfaces of wood, plastics and other materials lend themselves perfectly to roll-leaf labeling. A roll-leaf label or trademark does not rub or wear off easily, since the roll leaf

* The Meyercord Co., Chicago.

[1] See "Decals Automatically Applied," MODERN PACKAGING, Dec., 1952, p. 101.

[1] See "Fired-on Decals," MODERN PACKAGING, Feb., 1955, p. 115.

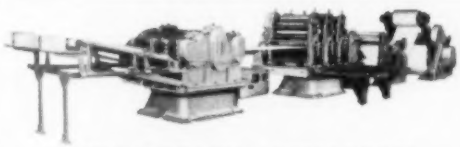
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Carton with delicate Wedgwood figures is an example of fine embossing.

becomes an integral part of the surface. Because no drying time is required, several colors can be applied in the same press operation.

Roll-leaf marking or stamping, of course, is not a new process. What is new is its recent application to trademarking and packaging operations.

For example, one roll-leaf manufacturer has developed a machine which imprints previously printed or lithographed ice-cream carton blanks with flavor or other designations, as needed. This equipment enables the ice-cream maker to carry minimum stocks and imprint as required.

Setting up the imprinter for a new imprint takes only a few minutes. Complete steel or brass dies are made for frequent use, steel dies for occasional use. The imprinter is mounted in an enclosed cabinet which can be wheeled alongside the filler or packaging machine. The imprinter is fully automatic. One operator simply keeps the hopper full of blanks and removes the imprinted cartons. The foil used comes in a wide color range, exact widths and rolls of 1,000 or 3,000 ft.

Embossing

by John H. Forsman*

Embossing is a graphic-arts process used to produce an artistic raised or indented impression on various materials, such as paper, fabric, leather, cardboard, foil or plastic. Either an over-all pattern or separate design feature may be produced.

The result for the packager is (1) enhanced richness and beauty of his packages, (2) an increase in attention-getting values gained from three-dimensional effects and (3) an opportunity to emphasize those elements in his package or label design that he wants shoppers to see first and remember best.

Packages with an embossed surface have a great display advantage over plain printed surfaces. Embossed materials "vibrate," particularly under artificial illumination, and in this way reach out to catch a customer's interest. The sales power of embossing may be further heightened by using ink or varnish and luminosity can be achieved by dusting gold bronze on the design relief.

There can be no doubt that embossing provides selling advantages. The consumer readily senses that packages given such meticulous care in designing and printing contain a reliable product.

The use of embossing in packaging covers a wide range—from an embossed tomato-can label to the most elaborate candy and cosmetic packages, reproduced in 10 or 12 colors, with bronzing and varnishing heightening the effect.

Although embossing is most frequently associated with packages that call for a luxury or quality treatment, it can be equally important in helping to sell items intended for everyday consumption. Embossed illustrations of food products on canned-goods labels, for example, emphasize the pictorial appeal of the product. Brand identity, manufacturer's name or product description may be given chief prominence where any one of them is played up as the main feature of the label.

Methods and materials

Embossing is produced with engraved dies cut in brass or steel or duplicates made from them. Enormous pressures are applied, sometimes as much as 200 tons.

Embossing may be done on either flatbed presses or roll embossers. The flatbed press operates at a very slow speed but is still widely used, especially where only a portion of a sheet is to be embossed.

In the roll embosser, material is fed between rolls, clothes-wringer fashion. This type of press may be used to produce either ink embossing, two-tone or regular effects.

In ink-embossing work, the ink-distributing roll contacts the raised portion of the engraved design and the ink is transferred only to the low portion of the embossed impression. Two-tone embossing employs a heated steel-engraved roll. The heated roll gives a faint discoloration to the surface impressed by the raised portion of the design. The result is a two-tone effect.

Special three-roll machines have been designed for material that resists permanent impression at high speeds. Unusual effects may be obtained, as well. The second roll may carry a trade name or advertising slogan, copy for which can be changed readily without the additional expense of altering the main embossing roll.

The paper that is to be embossed should have long fibres in the body stock. Soft surfaces lend themselves to best embossing results. Sometimes, because of the brittleness of a paper surface, it is necessary to apply steam heat to add moisture and make it flexible. But this is to be done advisedly, for it may discolor previous surface printing.

Quality and cost factors

The quality of an embossing job may be affected by atmospheric conditions during processing which cause paper and other materials to shrink or stretch. Temperature and humidity should therefore be controlled so that uniform, proper register will be maintained during all operations from color printing to bronzing to embossing. This argues for performance of all these operations in one plant, where atmospheric conditions can be controlled to a greater extent than when they are done in separate steps at different plants.

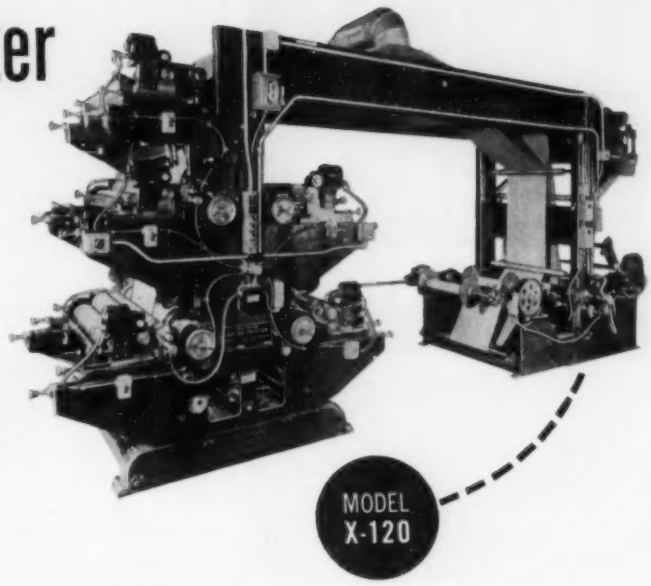
The material to be embossed guides the engraver in determining the depth of an embossing die. Costs involved in embossing include those for die making, make-ready of counter dies and the embossing operation itself. Special inks, gold bronzing, varnishing, etc., are extra.

In large runs embossing adds about 20% to the cost of a one-color operation, but, of course, there is no one estimating yardstick. For example, engraving a die for a tomato-can label-embossing the lettering and the sub-

* President, C. H. Forsman Co., New York.

World's Finest Flexographic Press

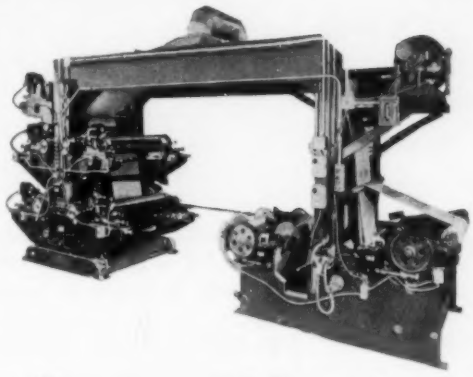
WOLVERINE Hydro-Printer



The Wolverine Hydro-Printer Model X-120 is now equipped with electro-magnetic induction brake and clutch for fully automatic, super-tension control on unwind and rewind units. Self-energizing and positive, eliminating time-consuming adjustments—a definite must for successful register printing of cellophane, foil, and any plastic film. Fully automatic and hydraulic with motorized free-wheeling ink rollers. You, too, can be satisfied—satisfied with the quality of work you are producing; satisfied with the amount of production you are obtaining; satisfied with the number of repeat orders your customers are sending you—because the very day you start production on a Wolverine Hydro-Printer Model X-120 is the day that you begin receiving the results that lead to satisfaction.

Specially equipped to handle the most difficult and toughest flexographic printing jobs, the Wolverine Hydro-Printer Model X-120 is the finest press available today for the printing of any plastic film, acetate or cellophane. Its overhead drive allows high speed production on polyethylene, saran, vinyl and pliofilm and, of course, cellophane, foil and paper. Optional equipment available, such as motor, ink pumps, drying units, anilox system, Flying Splicers, etc.

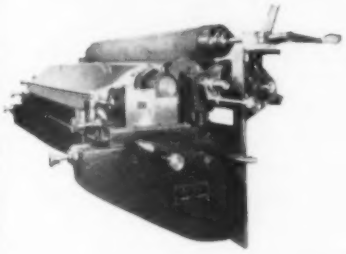
5 color, 36" wide press with Flying Splice at the Cello-Vision Corporation, 6812 West Lake Street, St. Louis Park, Minnesota, is running at speeds up to 325 ft. per minute on cellophane and 250 ft. per minute on polyethylene with good results. Depending on the width of the stock, they have taken as much as a TON per shift off the press.



Specifications

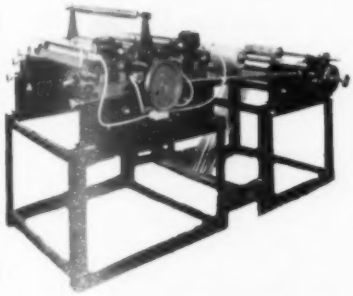
1 to 6 colors
26" to 80" wide
Up to 40" standard repeat
Repeats to 60" available

We build anything in the flexographic printing line



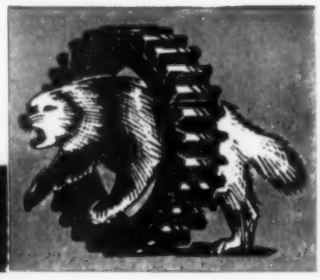
ONE COLOR ATTACHMENT

Standard color unit from Hydro-Printer with extra mounting brackets in order to mount this attachment to existing converting machine. Built in any width for coloring and printing. Free wheeling ink rollers are optional. Also built with base rail as a floor model.



WOLVERINE CUB PRINTER

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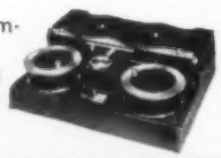
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Principles of Ink Selection

by William C. Walker*

Printing ink is the vital component of modern packaging which draws the attention of the customer and sells the product. A factor of such basic importance merits careful consideration and attention. Printing inks are individually formulated for most jobs and differ greatly from one another. Therefore the generalizations presented here cannot hold for every case.

Types of inks and stock

Printing inks vary greatly in their nature, but essentially they all consist of coloring matter in a liquid medium. This coloring matter is soluble in the liquid in very few cases, for example, some of the flexographic inks.

In the vast majority of inks, insoluble pigments are used to give a high degree of brilliance and opacity to the finished print. The liquid portion of an ink is frequently referred to as the vehicle, since it carries the pigment over the distribution system of the printing press and finally to its proper place on the printed product. Once this job is done, the vehicle must lose its fluid characteristics and become the binding agent.

Flexographic inks are used with molded rubber plates on a rotary web press of relatively simple design. The long-lasting plates are easily changed, which helps to make the process practical for both long and short runs. The resilience of the rubber and the principle of its "kiss" transfer of a thin film of ink allow uniform printing on both slick and coarse surfaces. Most flexographic inks used today are fully pigmented, although transparent dyestuff inks are advantageous for certain materials and a few specific color effects.

Gravure inks are applied in quite a different manner. They are printed from etched metal cylinders which carry the ink in little pockets in their surfaces. The gravure process produces better detail than flexographic printing, but large solids are generally not printed so well. Gravure inks are well adapted for use where overprint lacquer, varnish or wax is used, since, like flexographic inks, they usually have high resistance against bleeding into such coatings.

Heat-set and steam-set inks are printed by the well-known typographic or letterpress process and heat-set inks are gaining importance in lithography. Heat-set inks dry by the forced evaporation of a solvent, as do flexographic and gravure inks, except that the solvent must be much less volatile to keep the inks from drying on the press roller. Heat-set inks are used for some types of packaging work.

Steam-set inks are gaining wider use in the printing of packages because of their low cost, freedom from odor, rapid drying qualities and their excellent behavior on many types of printing presses. The vehicles of these inks are formulated to harden immediately on contact with water.

In commercial printing shops the water is frequently applied by directing a steam jet against the prints coming off the press. In many cases, however, there is sufficient moisture in the paper stock so that no steam need be applied. This is commonly true in the printing of corrugated cartons, where steam-set inks are applied to the fibreboard stock from rubber plates.

Flexographic, gravure, heat-set and steam-set inks all dry rapidly enough to be used on web-fed presses in high-speed economical production.

For best results, steam-set inks require a considerable amount of absorbency in the stocks on which they are printed. Heat-set inks require stocks which will withstand a considerable amount of heat without deterioration. This prevents their use on glassine and plastic films, as well as on many other materials used in packaging. This leaves flexographic and gravure inks as the best for the new transparent and nonporous surfaces now so popular.

Overprinting

Glossy prints are frequently desired in packaging, but in many instances, this is difficult to attain. Only certain flexographic inks and modifications of the linseed-oil inks will give gloss directly and then the printing stock must be of high quality. Gloss can be developed for other inks by overprinting with a clear lacquer or varnish. Such overprinting is again most

* Associate Director, National Printing Ink Research Institute, Lehigh University, Bethlehem, Pa.

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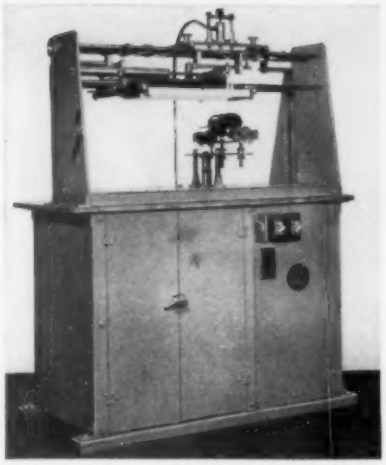
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effective on high-quality stock and can brighten and bring out the colors as well as produce a surface gloss.

Special properties

Rub resistance. Another important property of ink films for packaging is resistance to rubbing and other abrasive action. Packages encounter such action in the process of fabrication and filling, during shipment and in the hands of the customer.

A certain degree of rub resistance can be added to many inks by the inkmaker, but the surest means of increasing rub resistance is the use of an overprint lacquer or varnish.

Lightfastness. Many packages will be displayed on shelves or in show windows for considerable periods of time, so lightfastness of the printing is important. Lightfast pigments are now available in many colors. However, permanence to light is a matter of degree and very few pigments are completely unaffected by light. Lightfastness is much easier to attain in full strong colors than in pale tints; dilution with whites makes nearly all pigments more sensitive to light.

Resistance to special agents. Often the product to be wrapped or packaged is one which will attack most ink films. Soaps and alkalies are particularly troublesome, since they strongly attack both the binders and the pigments of printed ink films. It is frequently very difficult to impart satisfactory resistance to soaps and alkalies while retaining the other properties needed in the ink. Dry cleaners are particularly difficult.

Food products introduce a number of interesting problems for the inkmaker. Many foods such as shortenings, salad dressings, meats, cheese, butter and bakery goods contain oils or greases that act as excellent solvents for printing-ink binders. If ordinary inks are used in the printing of labels or wrappers for such products, it is quite likely that the prints will run or that the color will be transferred to another part of the wrapping or to the food itself. Other problems arise with foods which are kept in deep-freeze units, under very low temperatures and prolonged contact with moisture.

Toxicity is another consideration which arises in connection with the printing of food packages. Federal and state governments are becoming increasingly concerned over the effect of printed matter on foods.

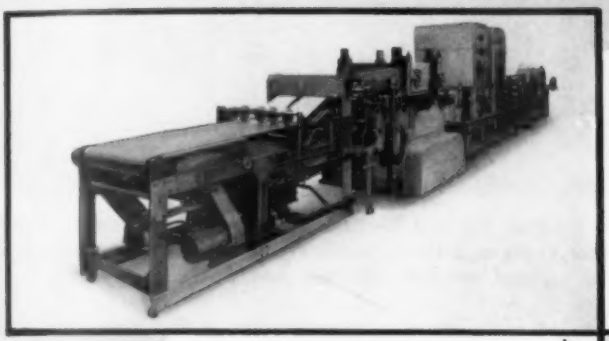
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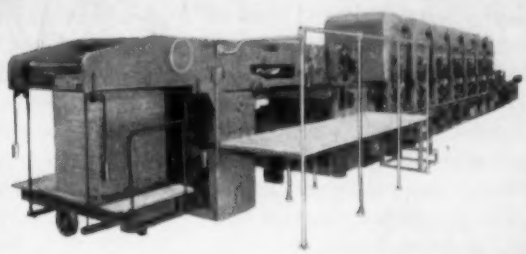


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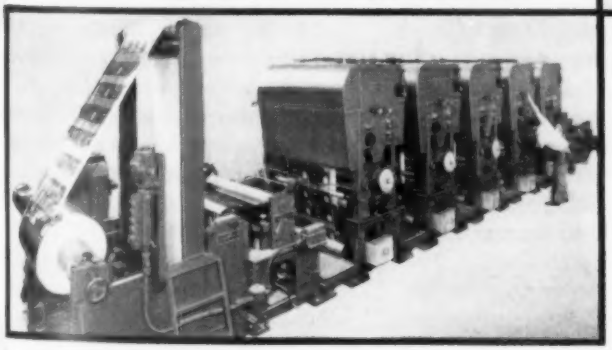
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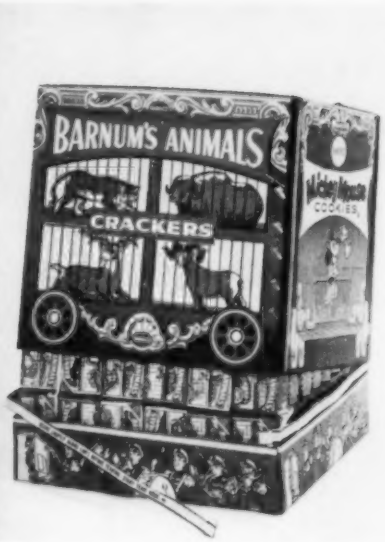
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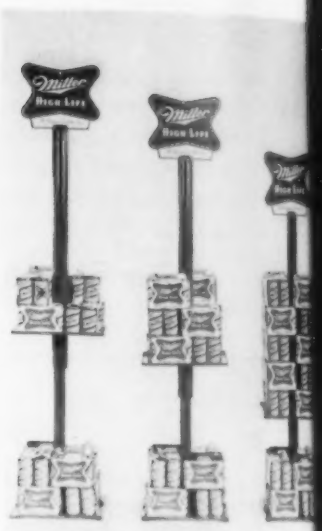


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Effective







Giant package replicas (left) announce that the packer is proud of his new package. A timesaver (center) for dealer is this easy to open shipper-merchandiser with stock all arranged ready to sell. Customer convenience is stressed (right) by mechanical pole stacker that moves beer stock up to buy level as cartons are removed from center platform.

If displaying your packaged product in the retail outlet is not an essential part of your packaging program, you are missing an opportunity to give a final touch of distinction to your carefully designed package, your last chance to urge the excellence of your product. For the primary service that the display performs for the manufacturer is to get his package out of the chorus line on the store shelf and onto the center of the stage.

It is not enough to arrange for displays as an afterthought to your other merchandising efforts. Timing is the stage manager of every effective display—important in the plant and in the retail outlet. If your packaged product is ready for shipping and your shipper merchandiser is due next week, or your product arrives in the neighborhood store to find the wire display rack you provided already choked with odds and ends of merchandise, your efforts have missed fire.

The giants in the packaging field coordinate package planning, with TV, radio, and newspaper advertising and store displays, so that all elements of the merchandising operation dovetail. The day the radio sends the listener to the supermarket for the special offer or the new wonder food is the day the product is displayed in eye-catching array.

Some manufacturers recently have attained the precision of the producer of a road show for elaborately displayed promotions, booking a display in advance through a regularly scheduled routing of supermarkets.

The many reliable suppliers of merchandising displays throughout the country will help you with this kind of planning. Most of them offer complete creative service as well as production facilities and will work with you to make sure the display is integrated with other advertising media and designed to create the impression you desire.

Pre-testing a proposed merchandising unit in selected areas before going ahead with full-scale use is also a recommended procedure.

Theoretically the materials that can be used in point-of-purchase displays are unlimited. For the most part, however, the basic materials are paper, paperboard, wood and wood products, metal and wire, glass and plastics.

The use of plastics continues increasingly popular, with plastic foam a relative newcomer of broadening application; while paperboard has the widest range used alone, because of its economy and suitability to short-term promotions. Its increased use has been particularly evident in the construction of floor stands and counter dispensers, where its ease of assembly and sturdy construction assure a useful life span at modest cost.

Formed plastic sheets—principally acetate, styrene and vinyl formulations—have been coming up fast as a popular display medium. The amazing formability of the materials makes available a range of colorful, three-dimensional, lightweight trade characters, replicas and novelty pieces. Cost of the units is relatively low and service life long.

Much work is being done in pre-printing the plastic sheet before forming. This cuts the cost of the pieces even more as it opens up rotogravure and offset printing in addition to silk screening and affords multicolor work with a minimum of hand operations.

Because mold costs are low (plaster of paris, wood, plastic, etc.) greater freedom is offered in display sizes. Huge wall displays and package replicas for indoor and outdoor displays

package displays



Oversize package replica (left) facilitates identification of product in stand. Shelf extender makes package a standout, increases shelf stocking capacity. Even nickel candy can be given a seasonal treatment for extra sell at Halloween. Wrap-around (far right) for shopping cart provides another type of seasonal lift for year-round item.

are being produced which dwarf efforts made with other materials.

Constructions

Special constructions are called for in the display of certain products, and supplementary materials are required for complete display of products in certain settings, particularly in windows. These aids are all relatively simple, though they range from the trimmings and props employed in such great variety by department stores to a little motion display for a drug counter which operates on an ordinary flashlight battery.

Location of the display

Certain locations in the store lend themselves to displays of the products sold by the store. For example, practically every retail outlet which could profit by attracting the patronage of the passer-by uses its window.

Within the store, several choice locations offer excellent display spots. However, despite varying emphasis, they all present possibilities and may be classified as follows:

(1) Cash, information and sales counters. In the smaller stores, these may be one and the same.

(2) The walls. Wall space includes the spaces behind counters which may show a recessed shelf or counter called the back bar; the remaining free wall space, which may consist mostly of shelves—also used for display; or a blank wall area which may be utilized to display wall units and hanging dispensers.

(3) The floors. Recent display technique has capitalized on the space at each end of island counters for separate display; the space immediately adjacent to the cash-register counter, chiefly for jumble baskets; the area immediately to the right and left of entrances and exits; and separate islands past which the consumer must walk in his search for a product.

From another angle, certain stores and departments within stores utilize the display more than others. They are a necessity in the various retail specialty stores, which popularized their use, and the big self-service and jewelry stores are following suit.

In this connection, plans for gaining dealer acceptance should be part of your advance planning. Salesmen should be alerted to sell the dealer on all the advantages of the point-of-purchase material.

Dealer acceptance has established some patterns. A major influence on most recent display design is conservation of the dealer's time and space. The shipper-merchandiser that is opened in 60 seconds revealing a completely arranged display of merchandise exemplifies an ultimate in time saving and the pole stacker the acme of space saving. Both of these have secured supermarket acceptance. Another display popular with supermarkets is the paperboard wrap-around that is used to disguise the shopper cart, providing a mobile unit that can be moved easily to any sales spot and to the stock room.

The counter display has gained widespread acceptance in smaller retail outlets and floor stands are seen as well in auto-accessory, drug, hardware, grocery and liquor stores.

Dramatizing the product

There are many compelling reasons why merchandisers emphasize the packaged product in display. The same qualities that give a package shelf appeal are equally effective when incorporated into the advertising and display promotion. Here the package

(*This article continued on page 580*)

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Modern Packaging Annual Editorial Index

(Index to Volume 28, September 1954 through August 1955)

● You will find this extensively cross-referenced Cumulative Editorial Index a welcome time saver in locating editorial material that has appeared over a year's span in regular monthly issues of Modern Packaging magazine. More than that, you'll discover that the Index increases the value of your file copies by providing a considerably more detailed breakdown of their contents—particularly of "buried" references within an article—than is given on the "Contents" pages of the issues themselves.

This Cumulative Index is actually a two-in-one affair: an extremely detailed Alphabetical Index of Subjects plus an Index of Authors.

In the Alphabetical Index, each basic listing by subject is alphabetically cross-referenced by *industry*, by *container type*, and by *material*. As a result, users of the Index are enabled to carry out truly exhaustive packaging research assignments on "short order" and with minimal effort.

Write for your free copy to Readers' Service Editor,
MODERN PACKAGING, 575 Madison Avenue, New York 22, N. Y.



The eyes have it...



While the eager youngster is quick to swap his nickel for the brightly boxed menagerie crackers, his mother shops more carefully. Both respond to the same stimuli, pick the packages that catch their eye, excite their interest, whet their appetites. And in this age of mass display, a manufacturer can do big business with both by printing his packages and labels in gravure.

Gravure prints persuasion on packages, wrappers and labels. It depicts the product in fullest fidelity, shows colors to their best advantage, adds quality.

Gravure can be used for small runs or unlimited quantities on paper, board, cellophane, foil, vinyl and other packaging materials; and on long runs cuts costs. Merchandisers convert more customers with packages printed in gravure.

Intaglio prepares cylinders and plates for gravure printing . . . takes your art and copy, makes the color separations and the finished positives, engraves the cylinders and plates, provides color proofs for your approval, and to guide your printer.

Our three strategically located plants have the most modern equipment, much of which we designed ourselves. Our gravure craftsmen are more careful, competent, skillful and experienced; and work in three shifts for faster deliveries.

The quality of our production is evident in any of the vast number of packages and labels processed by us each year. Intaglio Service does more gravure production than any other company.

Our six offices are at your service.

Intaglio Service
CORPORATION

America's First Gravure and Letterpress Servicers

Executive offices: 305 East 46th St., New York; New York plant: 33-01 Hunterspoint Ave., Long Island City, N. Y.—731 Plymouth Court, Chicago—1835 Lewis Tower Bldg., Philadelphia—Intaglio-Cadillac, Inc., 4240-14th Ave., Detroit—369 Pine St., San Francisco—1932 Hyperion Ave., Los Angeles





Two ways of displaying frozen foods: (left) free-standing floor stand is made of aluminum-lined corrugated and packed with dry ice; (right) figure that stands 4½ ft. tall moves and talks to call attention to promotion items on display in regular frozen-food cabinet.



PHOTO COURTESY CONNELLY CONTAINER CORP.

With its interior facing printed, auto-supply product shipper unfolds into attractive, easy-to-set-up counter display all stocked for self selection.

is the vital link between merchandising effort and consumer identification and acceptance of the product.

The merchandising effort may be designed to introduce a new product, put over a special promotion, to effect a seasonal promotion, achieve tie-in sales, gain brand recognition, put across a new design for a known package, gain self-selection advantages in an otherwise serviced department, demonstrate product use or simply to stimulate impulse buying. The experts recommend that you define the purpose of your display carefully and try not to serve too many ends with one display.

Outstanding among the packaged products lending themselves to dramatic display are perfumes and other luxury or gift items including jewelry; sundries and notions or other products in transparent packages, which help the product to sell itself; packages reproducing the product in illustrations; and distinctive packages.

Special treatments

Some products—paints, cleaners, repair parts—may not have strong package or point-of-purchase appeal. Others are limited by retailing practices or product characteristics in utilizing their basically strong product or package appeal.

However, any limitations this suggests may be only accidental and not essential. Imagination and ingenuity change the picture daily. Not too long ago frozen foods seemed doomed to remain in standard store cabinets, depending chiefly on the sales appeal of the package surface. Now, various types of display cabinets have been engineered and new and improved varieties are in the offing.

Life of the display

The majority of displays are produced in expectancy of long life. This holds true of the simplest paperboard card, which may be left in a store window or on a shelf for months, performing an unexpectedly long selling job. For that reason, manufacturers attempt to make nearly every display unit one which can stand on its own for months if need be and at the same time flexible enough to be used serially or in harmonious combination with other promotional units.

Some display pieces are meant to be changed frequently, allowing great variety in sales messages, advertising themes and seasonal or special-promotion impact. The chief material of

PHOTO COURTESY WARNER BROS. CO.



Well-stocked wire counter display offers customer in ordinarily serviced department opportunity to speed up her shopping.

PHOTO COURTESY CHOPP PRINTING SPECIALTIES, INC.



Locking device built right into the package allows carton to be stacked so that it actually forms its own counter display rack.

PHOTO COURTESY DORSEY DISPLAY CORP.



Various manufacturers cooperated on medicine chest display stand to gain tie-in sales and to follow up advantage of national advertising.



Nothing . . . but *nothing* . . . succeeds at the Point of Sale like a Gibraltar floor stand!



AWARD WINNER

Jell-O* Sleigh Floor Stand Point-of-Purchase Printing class N.Y. Employing Printers Exhibition. Litho Super Structure by Einson-Freeman.



AWARD WINNER

Colgate-Palmolive Floor Stand Fibre Box Association. Litho copy panel by Kindred MacLean.



AWARD WINNER

Colgate Howdy Doody & Santa Claus Floor Stand Point-of-Purchase Printing class N.Y. Employing Printers Exhibition. The rotating litho copy panel by Kindred MacLean.



AWARD WINNER

Jell-O* Salad 4-Quarters Floor Stand Fibre Box Association. Litho copy panel by Snyder and Black.

DISPLAY DIVISION
Gibraltar
CORRUGATED PAPER COMPANY, INC.
3 Entin Road, Clifton, New Jersey

NEW YORK: LACKAWANNA 4-9684
NEW JERSEY: GREGORY 1-1450

*Jell-O is a registered trade-mark of General Foods Corporation.



PHOTO COURTESY PERMA WIRE MFG. CO.



PHOTO COURTESY VAC-FORM, INC.



PHOTO COURTESY ROBERT GAIR CO., INC.

Appropriate counter display for paint brushes, miniature house carries complete brush assortment in slots designed so competitor's brushes won't fit. Center: Vacuum-formed polystyrene provides compact counter display with gravity feed for self selection. Right: Unwieldy objects, too, can be effectively displayed, as corrugated shipper shows.

construction here is paperboard, well conceived in design and well put together. Other displays incorporate changeable copy cards and seasonal motifs into a more permanent construction which will encourage long-term use by the retailer. Itinerant displays are meant for repeated assembly, disassembly and shipment. Most often they use wood, plastics, metal, plug-in-type electrical mechanisms and complicated designs.

Trends

Several trends in retail point-of-purchase display stand out from the general progress of the medium. One of the most significant is the teaming together of packaged merchandise and its display, which helps to break the product out of traditional markets into newer and faster-moving channels of distribution. Cases in point: drugs and low-price variety items in self-service grocery markets; household gadgets and notions in drug-stores.

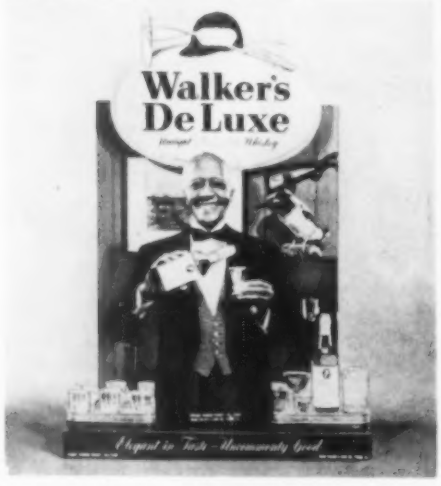
This trend in turn has assisted in bringing out from behind the counter many products heretofore unseen when not asked for, like household drugs and health aids, impulse hardware and all sorts of household appliances.

Counter displays which demonstrate the product or show one each of the line are also experiencing increased popularity, particularly those which allow for storage of the items displayed in the back of the dispenser for the convenience of the counter attendant. Sometimes promotional copy describing the products and giving the retailer fast selling pointers is also printed on the back of these display units.

As regards the display itself, major emphasis continues on self-service constructions. Dispenser displays are retaining their currency in the display medium, some of them incorporating the new light-and-motion mechanisms that operate on a simple flashlight battery. These displays were always popular with the public but at one time required a cumbersome apparatus which restricted them to larger units and special locations, or required maintenance small outlets could not give them. Now they can be placed in windows or on counters in the busiest of proprietor-operated stores.

While paperboard has been adapted to the hitherto more expensive types of display such as floor and

PHOTO COURTESY EINSON-FREEMAN CO., INC.



Package is featured prominently, in multi-plane window display.

PHOTO COURTESY GIBRALTAR CORRUGATED PAPER CO., INC.



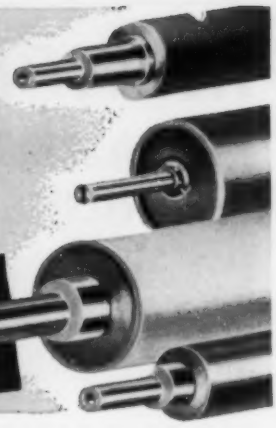
Corrugated counter displays for records can be sales-stimulating adjuncts to either independent record stores or record departments.

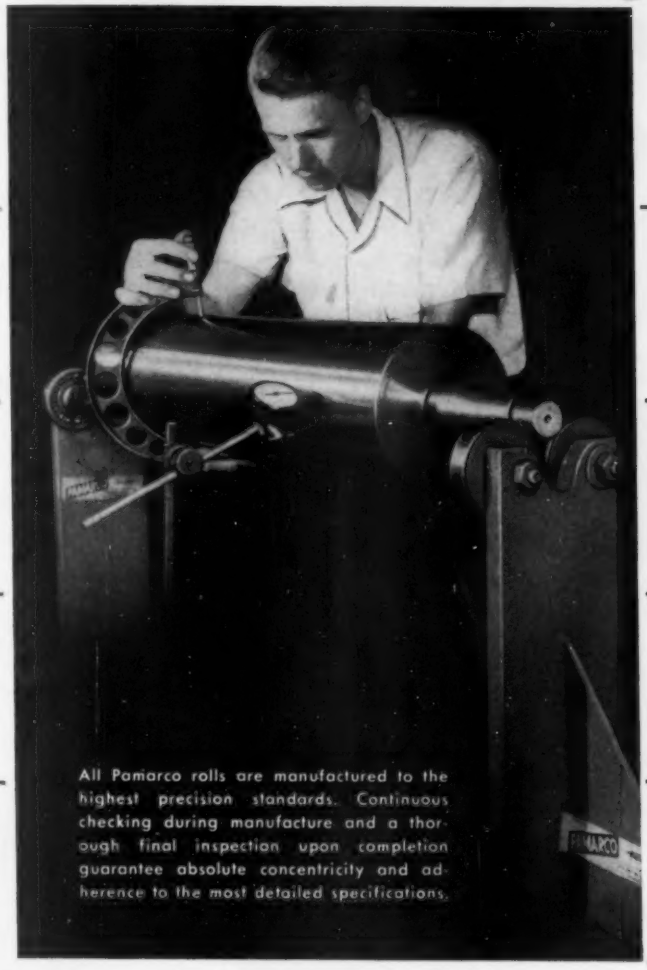
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ground finished

-precision made by experts to the most exacting specifications





All Pamarco rolls are manufactured to the highest precision standards. Continuous checking during manufacture and a thorough final inspection upon completion guarantee absolute concentricity and adherence to the most detailed specifications.

EVENFLO FLEXOGRAPHIC INKING ROLLS

Engraved surface meters ink automatically, makes time-consuming adjustments unnecessary. Save time, ink and rejects. Also recommended for applying all types of coatings by rotogravure.

no-flex FLEXOGRAPHIC PLATE ROLLS

Can't flex or whip, assure perfect impressions on every run. Tubular construction reduces weight, tests stronger than solid steel. Ground finish to exact specifications.

PAMARCO ROTO-GRAVURE ROLLS

Accurate core or base cylinders for rotogravure process reproduction. Recommended for long service in continuous printing production. Each roll carefully inspected prior to shipment.

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Cores by Pamarco for rubber covered rolls are supplied for every industrial application. All cores are machined from the finest grade shafting and ground finished by expert mechanics.

PAMARCO PLAIN STEEL ROLLS

Precision ground plain steel rolls by Pamarco can be supplied for every industrial purpose. All sizes and shapes are made by Pamarco to exact specifications including finishing to desired tolerance.

PAMARCO ROLLS ARE AVAILABLE FOR EVERY PRODUCTION AND PROCESSING PURPOSE INCLUDING

LIGHT DUTY ROLLS — ENGRAVED ROLLS
TUBULAR ROLLS — HEAVY DUTY ROLLS
CHILL ROLLS — WARM SURFACE ROLLS
IDLER ROLLS — CHROME PLATED ROLLS
RUBBER COVERED ROLLS

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Most modern presses are equipped at the factory with EVENFLO and No-Flex Rolls. Look for this sign of extra dependability on your new flexographic presses. Your press builder will gladly supply data on Evenflo Rolls. Ask for the facts, today!

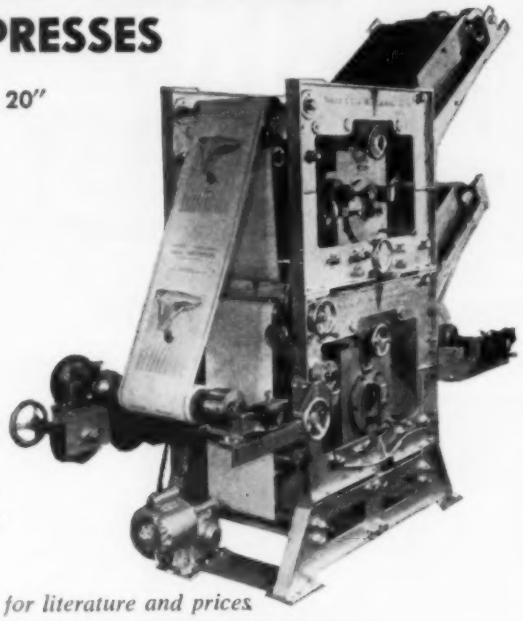
1014 OAK ST., ROSELLE, N.J.

INEXPENSIVE . . .

MINIATURE ROTOGRAVURE & ANILINE PRESSES

3" . . . 10", 15", and 20" web widths.

1, 2, or 3 colors.



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See this demonstrator in operation.

Use it to preprint your packaging webs.

Printing heads available for mounting on your bag or packaging machine.

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PHOTO COURTESY EINSON-FREEMAN CO., INC.



Whale figure demonstrates the new opportunities that vacuum forming offers for intricate displays.

sampler displays, new combinations of materials strikingly adapted to the theme they illustrate have been appearing, among them inexpensive plastics like polystyrene foam and acetate sheeting.

PERMANENT--

POLYETHYLENE CONTAINER DECORATION...



expertly executed, enhances the eye-appeal of your product at the right point — the point of sale.

- SILK SCREENING
- OFFSET PRINTING
- HOT STAMPING

Electronic QUALITY control insures superior QUALITY on small runs, large runs or re-runs.

Pen a post card for samples giving you a true eye-view of what PERMANENT'S Know-How and Can-Do achieved for other progressive manufacturers.

PERMANENT LABEL CORPORATION

49 ACKERMAN STREET
Bloomfield, N. J. - EDidson 8-6200



Moving and talking puppet made of steel with plastic skin, first used on TV, is becoming a successful point-of-sale demonstrator.

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*With a wealth of technical experience, **S&V** today employs the most modern scientific methods in producing the finest inks for every packaging surface. Rigid formulation and testing procedures, as well as the use of highest quality raw materials, guarantee the consistently superior performance of every **S&V** packaging ink. And **S&V** inks are the most economical because in actual press operation they produce more impressions per pound, which means a lower cost to you! Next time use an **S&V** ink for better results!!!*

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Sinclair and Valentine Co.

Main office & factory: 611 West 129th St., New York 27, N. Y.

OVER 35 BRANCHES PROVIDE SERVICE FROM COAST TO COAST

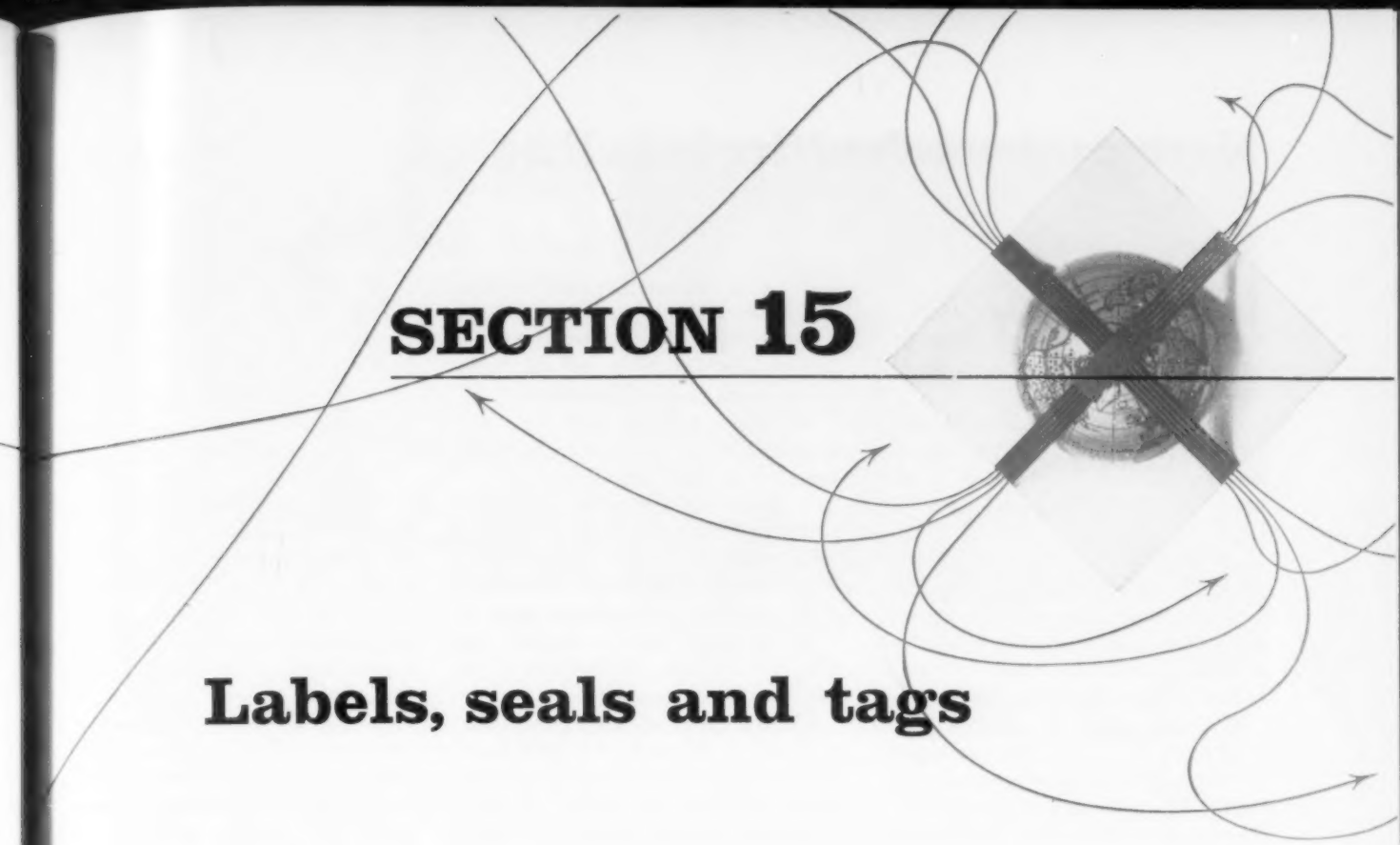
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SECTION 15

Labels, seals and tags

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New approaches in labeling

by GUY STREET*

Every merchandising success you see these days revolves about an outstanding packaging job. Often the label builds tremendous sales *single handed.*

This is particularly true in the self-service grocery field. It is likewise extending to hard goods, drugs, clothing—almost everything packaged and for sale.

A good label wields tremendous power in today's merchandising and, because competition is so keen, a product with a poor label or a label that is falling behind the times is bound to find rough selling ahead of it.

The planning of an effective label must begin with an understanding of several important developments and trends. The date of the Federal Food, Drug and Cosmetic Act, 1938, is as far back as you need to go. Since about 1938, and particularly since the war, self-service markets have loomed large. They grew from the housewife's desire to get her week's shopping out of the way in one trip if possible—and to save money by helping herself. Family cars and suburban living made the daily marketing hike even less practical. Today you'll find more than 80% of grocery sales in places where purchases are taken off the shelf by the customer.

On top of the supermarket trend is a more recent rush to complete one-stop suburban shopping centers. The centers are expected to double, if not triple, their number by 1957. Self-service shelves to sell all types of goods are part of these plans.

Recently a panel of Sears, Roebuck executives, discussing packaging case histories, stated these facts:

1. More than half of Sears' business is during 12 hrs. of the week (nights and Saturday).

2. During peak hours, customers often outnumber salespeople 10 to 1.

3. The only way to exploit this situation is to relv on the package or label to sell the product.

The day will come, the panel forecast, when all packaging will have uniform elements to help customers make decisions. At present (except for grocery or drug stores) 80 to 90% of exposed merchandise doesn't show at a glance the price, size, etc.

It is commercial practice, for example, to put labels inside garments, but for quick selling they obviously should be on the outside.

The merchandising division of the National Retail Dry Goods Assn., never yet haywire, analyzed: "From present indications, the time is not far off when the typical store will have very few counters at which customer and salespeople meet face to face.

"Retailing is currently entering a dramatic period of development characterized by pre-packaged selling."

In other words labels are taking over for the salesman. They have the chance to do a tremendous job. Just how far self service can go is to be seen. It has "arrived" as far as groceries are concerned. For this reason a look at supermarket label results is worthwhile for other fields.[1]

Several other factors have added to the label's selling power. One is the great number of new products—frozen foods, ready mixes, brown-and-serves, wonder chemicals, etc.—that have brought new pleasure. For this reason, labels are scanned for "news" more than they used to be.

Another is the label's great performance on TV. For some reason television commercials almost always get even higher "seen-associated" ratings when the package itself is thrust close up into the spotlight. When the package has a good message and recognition elements, it means sales.

Another factor heaping importance on the label is the point-of-purchase display picture. Retailers have learned the great value of space. Supermarkets particularly are anti-clutter conscious and are regulating the use of displays. The result is that, even with heavily merchandised brands, there are periods when the only point-of-purchase advertising is the label.

The start of most label planning is the Federal Food, Drug and Cosmetic

*Manager, Packaging Div., Schmidt Lithograph Co., San Francisco.

[1] "Super-Selling Housewares," MODERN PACKAGING, Dec., 1954, p. 104.



PHOTO COURTESY SHELLMAR-BETNER

Appetite appeal on cookie package is achieved with superb six-color gravure printing.



PHOTO COURTESY WONDER CORP.

Many an extra slice of bread will be consumed because these realistically illustrated wrappers sell *end use* instead of product.



Practically perfect for supermarket selling is retailer's opinion of these informative eye-appeal labels.



Burnished gold decoration and embossing help these tea canister labels tell a "quality" story for the product.

Act. This law gave to foods, drugs and cosmetics in 1938 what the Sears' panel predicts other packaging will have: uniform elements to help customers make decisions.

Our mothers didn't always trust label claims; they relied on grocery or drugstore clerks for sales talks. In contrast, our wives prefer to make their own comparisons with the following legal assurances:

1. *The label must not be misleading in any way.* (For example, you can't use a leading Italian olive oil brand and design to sell soybean oil.)

2. *Products must state common names.* Some products are "defined" and need not supply a list of ingredients. Others "not defined" (such as pork and beans) must state all ingredients in a way that is not misleading. This is usually in order of predominance. (A justifiable exception: pork and beans.)

3. *Net contents must be stated* in uniform terms. (Liquids in largest applicable units of fluid ounces, pints, or quarts; non-liquids in avoirdupois ounces or pounds. Additional metric weights are okay.)

4. *Standards of quality* and *standards of fill* are assigned a few staple canned goods. "Below standards" must be announced in certain size type. Other products not assigned standards still must not be deceiving about their fill or quality.

5. *Imitations,* artificial flavor or coloring, and chemical preservatives must be stated, if used.

6. *References to dietary properties* must be backed up by actual figures. (You can't say, "Loaded with Vitamins" and let it go at that.) After "Vitamin Enriched" you must list percentages of minimum daily requirements.

7. *Labels on drugs and cosmetics must state the product's purpose.* Also, when not to use it. Adequate instructions for use are required.

8. *The name and address of the manufacturer, packer or distributor must be given.*

The above is only a layman's outline of the law. For details one should contact the Food and Drug Administration, under the Department of Health, Education and Welfare, which has offices in larger cities.[2]

The 1938 law covers only foods, drugs and cosmetics used by humans or animals. Most other products are still free to say what they will so long as they don't run afoul of the Federal Trade Commission with false claims.

The F&DA doesn't "approve" labels, but it is a good idea to learn their opinions on projected labels.

To the mandatory statements re-

[2]See also, "Legal Aspects of Packaging," p. 38.



Color helps do the selling job for this product. Label is printed in blue, red and green on white.



Novelty labels do the selling job for flavorings. Label is die cut. Chef's cap is attached by cellulose seal.

PHOTO COURTESY OF LABELS, EVER READY LABEL CO.



PHOTO COURTESY LITHOLA CORP.

High-gloss label stock is durable, scuff and stain resistant. Lacquer coating is not required. Whiteness suggests purity, quality.

quired by law, the National Canners Assn., Washington, D. C., suggests some "voluntary additions" in the manual, "Canned Food Labels."

One fact the NCA points out is that you can say anything or show anything on a label as long as it is (1) not untruthful or misleading, and (2) it doesn't interfere with the prominence of mandatory information.

This means that any label is free to give quite a sales talk in both words and pictures. The trick is to lay things out in a way that gives you everything a perfect label must have —*attention value, stated advantages and the right amount of prestige.*

The *attention value* of a label is self-explanatory. Some shout the name of the product in big type. Others rely for fast identification on pictures that dominate the package. Still others direct attention to a trusted, recognized brand.

Who will fail to recognize Campbell's Soup, Armour's packaged meat or Dole pineapple? Dole checks the exact value of its graduated-blue label background throughout its advertising and displays, under all kinds of light. You can recognize an important part of the grocery's pineapple section from a mile away!

Once a label has itself noticed, it must *state advantages* quickly. Advantages are as varied as products, so it is impossible to make a rule here. The advantages may be 28 written ways to use a vacuum cleaner.' Or they may be an unwritten statement of quality found in a fine-wine or spice label.

The fact that labels are read has brought panels of selling copy, such as you once read only in ads, wherever space allows it.

In supermarkets you'll find a colorful world of food pictures on labels because the specific advantages of good flavor, looks and uses of food are best revealed in direct color photographs. And, largely, it is the best way to capitalize on another strange thing about self service: It was proved in a recent study that the housewife enters the supermarket with only a few purchases in mind; *more than two thirds of her purchases depend simply upon what looks good.* She is planning a menu. Food pictures that capture attention and excite her appetite pay off.

Federal law doesn't restrict label pictures to what is in the can. So a can of sliced peaches may show a big piece of sliced peach pie. Or Minute Rice can show fried chicken on a plate with rice to better project rice into the housewife's menu. (Of course, this technique can be overdone, even though it doesn't violate the law, for there is a definite borderline between skillful promotion and an outright attempt to deceive. The packager who permits his label to become misleading still has to answer to the court of customer opinion.)

Many wonderful ideas are now coming forth among ways of showing food. A recent winner was the Red Owl Cake Mix box that showed half a cake on the front and the opposite half on the back. When boxes were alternated front and back on the shelf, true-as-life cakes appeared.

Because of menu planning, recipes, particularly illustrated ones, have been strong sales builders when included in labels. It has been shown that three out of 10 women will pick up a plain printed recipe in a store. A popular brand of tomato sauce, for example, emphasizes its advantages with an assortment of 75 different recipes among its 8-oz. can labels.

Premium offers and "1-cent" sales are advantages and there's no reason why they shouldn't be superimposed on labels in a newsy (but not distressed) way. For some reason a newsy color patch has pull. A rice company put a simple copy claim on a panel crossing the face of its package; sales increased 29%.

Appropriateness. Labels should suggest the reliability, integrity and desirability of the products they are intended to sell. Some products demand a label that suggests prestige, quality or even sophistication. Wines, candies, cosmetics and gift items are good examples of products that call for fancy labels. By contrast, automotive goods simply never have sold well in sophisticated boxes. (Instead, brand name, how-to illustrations, directions for use, etc., are proved devices for establishing distinctive sales character for these and other essentially mechanical products.)

Generally, among consumer goods you see a different shade of the "prestige." Things may be newsy—even jazzy—but their over-all appearance must be one that speaks neatness, cleanliness and quality. It soon boils down to first-rate carton or label manufacture—good design, good colors, good finish and the like.

With this list of ingredients the package designer has a tremendous job and also a tremendous leeway for his talents. Because he must know solutions to mechanical problems, he is a specialist, found either in a design studio or employed by the graphic arts.

In any case the finest label design you can buy usually turns out to be a bargain. A label designed to produce maximum product turnover is the label that is best designed to keep costs down. It is a proved "operation bootstrap."

Most alert packers figure to overhaul their labels every three, four or five years. Those on top of the market—the biggest brands—consistently make every improvement possible.

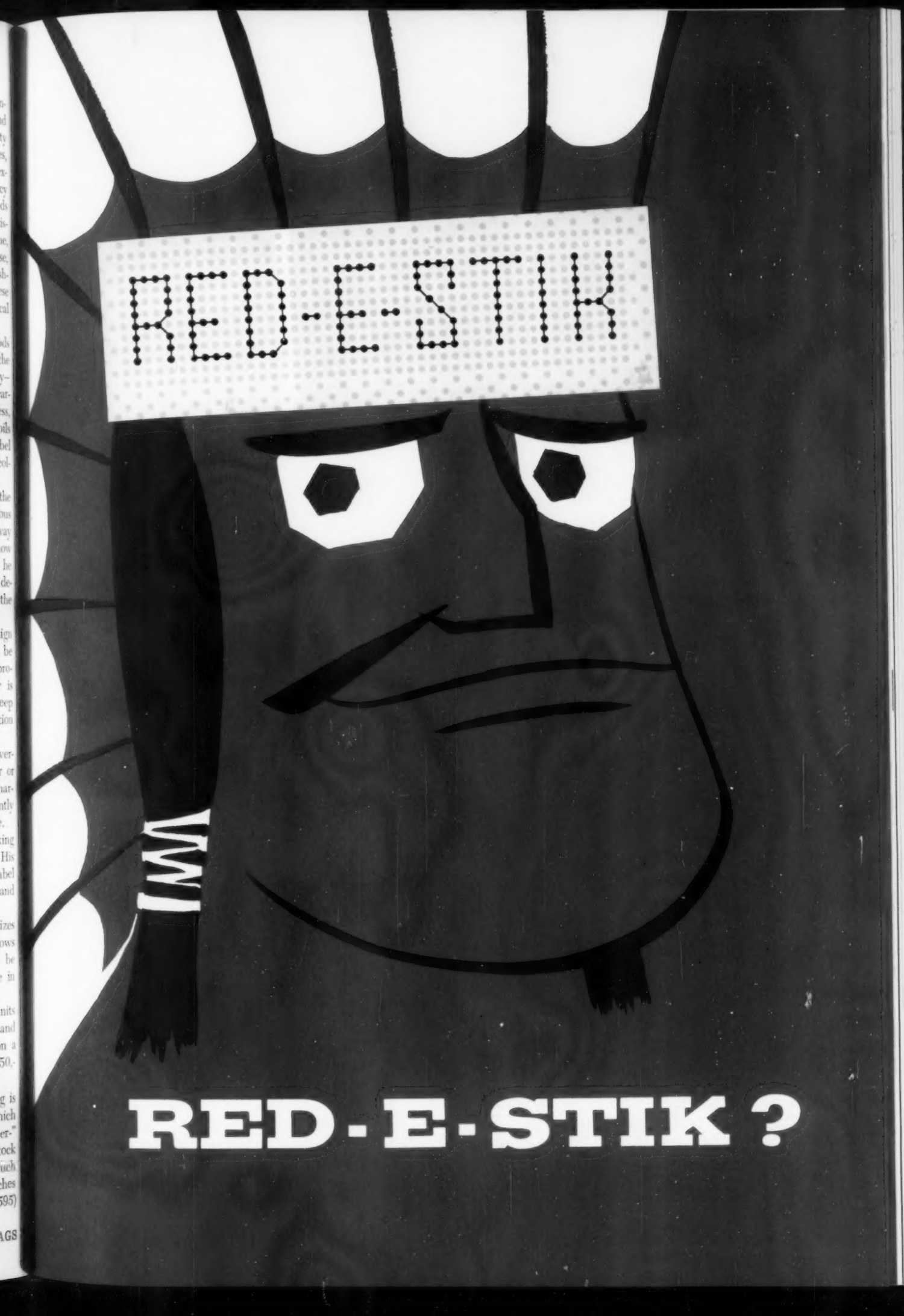
The graphic designer is working with tools that he knows well. His design will fit economically into label production, the packers' set-up and above all will get results.

There are about 15 common sizes of can labels. The finished size allows almost no tolerance. Each must be cut exactly right to avoid trouble in label-sealing machines.

Most can labels are bought in units of 50,000 or 100,000 of one kind and are in turn run by the printer on a combination or gang sheet run of 50,000 or 100,000 large sheets.

The usual paper in can labeling is 60 lb., clay coated one side, which gives a clean white reflection. "Super-" calendered (but not coated) stock is satisfactory where not too much white shows. The finishing touches

(*This article continued on page 595*)

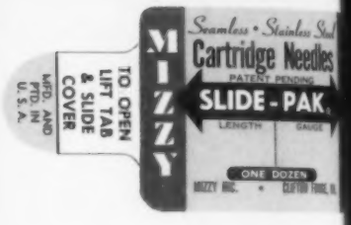

RED-E-STIK
I WI
RED-E-STIK ?





GLASS

This insuleting glass company uses a Red-E-Stik label for identification and specification purposes. Because Red-E-Stik adheres to glass, it is also widely used as a sales aid in store windows.



DENTAL SUPPLIES

Here is a Red-E-Stik application by a dental supply firm. The label identifies the contents of a plastic package of instruments while the product remains visible. The label also serves as a closure for the package.

. . . AND



ELECTRONICS

Here is part of a series of Red-E-Stik labels used in radio and TV tube packaging. The circular Red-E-Stik label is designed for adhesion to the glass surface of the tube. Once again, convenience of application and ease of removal are clearly evident.



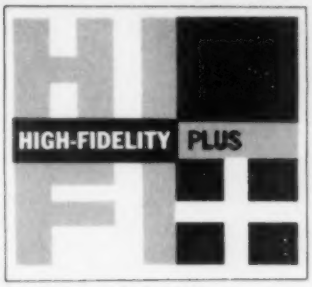
STAINLESS STEEL

This use of Red-E-Stik to stainless steel kitchen products provides a label which adds immeasurably to appearance. Red-E-Stik is easily applied to stainless steel, and, there is no mess whatsoever when it is removed.



ICE CREAM

An ice cream firm needed a label, identifying each flavor, to adhere to the plastic container cap, and withstand the temperature in which ice cream is stored. Red-E-Stik filled the bill.



HI-FI

Red-E-Stik is widely used in the recording industry. This label is designed to identify HI-FI recordings on albums. Red-E-Stik is the answer . . . the smooth, laminated surface dictates a label which will stay put.



ADVERTISING

Red-E-Stik has limitless advertising applications. Because of its no-wetting quality, it is especially desirable for paper and cardboard surfaces since no contraction takes place as in the case of gummed labels.

It has been said that pressure sensitive labels are the most significant label discovery since someone years ago decided to put gum on the back of paper. Ever Ready shares in this enthusiasm, for our Red-E-Stik pressure sensitive labels fire the imagination. They provide a flexibility which is not to be found in any other area of the label business.

The labels on this page provide a small segment of the many Red-E-Stik applications. As you can see, Red-E-Stik is used in all types of industries and for all kinds of label purposes.

HOW RED-E-STIK!

Basically, the growing trend toward Red-E-Stik is easy to understand. Red-E-Stik is convenient to use. It is a no-wetting, quick-sticking label that can be applied to surfaces where many other labels will not stick. It can be used on any smooth surface, on plastics, glass, metal, wax or wood.

Red-E-Stik labels are easy to apply, either manually, by simply peeling the label from the backing, or, by automatic dispensers that greatly speed-up the operation. And, they are just as easy to remove, without marring the finest surface. Red-E-Stik labels are as permanent as you want them to be. Now, that's flexibility with a capital F. . . and how!



HOSIERY

A Red-E-Stik idea for seasonal promotions. Applied to cellophane packages of socks, this Red-E-Stik label can be removed when the holiday season is over, and, the hosiery can be sold as regular stock. Red-E-Stik is easy to peel from cellophane without tearing.



Creating function out of mass always demands visualization. The architect combines cement and sand and steel and a skyscraper is born.

Many businesses are like that. Converting pressure sensitive paper into Red E-Stik labels falls into a similar category.

Blending in Red-E-Stik with the design, engineering, and packaging of products requires practical power of imagination that springs primarily from one source—experience. That's why Ever Ready's more than 40 years of label leadership is so important to every label user.

At the present time, an increasing amount of the 15,000,000 labels produced in our plant every day are Red-E-Stik labels. This is our background of experience, a background of 60,000 orders a year which we feel qualifies us to carry the ball for you in turning out Red-E-Stik labels that will really do a job . . . and how!

Why not call, write, or visit Ever Ready today. We'll be glad to work with you on a planned Red-E-Stik label program.

EVER Ready LABELS

EVER READY LABEL
CORPORATION
117 East 30th Street • New York 17, N. Y.
PLANT AND EXECUTIVE OFFICES: BELLEVILLE, N. J.

may consist of some bronzing or, more often, a varnish.

The best label varnishing is done on a special varnishing machine consisting of a rubber-faced cylinder that rolls on the varnish. This is followed by a trip through a long heated oven where sheets dry before stacking.

A new scuff- and water-resistant heat-glaze varnish is being seen more and more. This makes a sparkling label, almost as though it were cellophane laminated. It gives an unequaled polish to the finished label.

Fancy bottle, can and jar labels can be given a wonderful assortment of effects by bronzing, burnishing, embossing or die cutting.

Some of the finest tuna labels are embellished by "gold" touches. The gold is in reality bronze powder dusted by machine against a tacky drying "ink" lithographed on the sheets. A polished gold effect is given to many wine and spice labels by a machine that burnishes the bronze-powdered image to a shiny smoothness.

Embossing, an old-time favorite, is still used effectively on the fanciest of labels. It is done from a set of dies that make bas-relief images in the paper. Labels for bottles, canisters and jars come in almost any shape. Large label houses usually have on hand an assortment of die shapes and sizes. The trend, however, is toward a standardization of bottles and label shapes so that labeling can be done better by machine.

One of the biggest trends in the beverage industry is the heavy emphasis on high-quality labels. Almost every beer brand (a total of about 15-billion bottles a year) now has a new label design gravure printed on paper-backed foil. The advantages of this type of label are its unequaled moisture resistance and its clean metallic sparkle that seems to say "cleanliness, purity." It also can closely match the lithographed-on-tin beer can (of which there are another six billion a year). Foil-gravure is also now appearing on some food-can labels with fine success.

Lithographing labels directly on tin is done by the can companies. The designs and results with beer (and more recently, soda pop) have been truly outstanding. Giant chemical drums lithographed in several colors are another recent advance.

The chief difficulty with lithographed tin for the general packing industry is inventory expense. Reproduction of top-quality food pictures is another problem to whip.

The field of separate labels for boxes and corrugated cartons is today narrow indeed and growing narrower. Suppliers now print attractive labels on the board of most containers.

At a recent Point-of-Purchase Symposium one of the speakers told how corrugated shipping cases containing Zenith radios had enough appeal to sell self-service traffic. Recently a new color-coated corrugated board has been introduced. Skill in printing from rubber plates has resulted in many beautiful fancy corrugated containers that are the sales, gift and shipping box all in one.

Other labeling trends that have been noted include:

1. Cartons lithographed or printed in gloss inks on special new boards.
2. Large boxes for flour and liquids, made by lining corrugated cases with paper or plastics bags.
3. The use of saran, polyethylene and other films to package everything from frozen foods to nuts and bolts. (Labels are printed directly on these.)

What appears to be the next step in the self-service revolution is already afoot in supermarkets. Multiple cartons are not a brand-new idea, but today they are getting the ingredients of a good label—attention, "sell" and prestige. For example, at least two brands of beer are employing direct color illustration on six-pack cartons with very favorable sales results.

To get a quick idea as to how effective modern labels can be, one need only explore a grocer's frozen-food department. Here you find cartons with transparent windows, aluminum foil dishes, lithographed cans, plastic film bags and paraffin-coated boxes. Labels take the form of box wraps (usually paraffined or film laminated), labels inserted into bags, stickers and direct applications of all types.

Labeling processes were ready for frozen foods. Waterproof inks, varnishes and papers were perfected years ago for produce-case labels. Another revelation in the freezer is the speed with which each package tells you what's inside and arouses your appetite.

Compare, for instance, the new package of frozen salmon steaks with the average can of salmon on the shelf. The frozen package will be a lively salesman in itself—colorful, informative, aggressive and probably with a tremendously appealing picture of golden-brown salmon steak.

The can label may be one that has changed little over the years—is just a "label"—and has not assumed fully its new sales duties.

So a fine product like canned salmon doesn't move forward year after year, whereas the sale of frozen fish has, in recent years, been rising a million pounds or more annually.

A part of this dynamic growth must be due to this product's modern packaging. You don't see a salesman presiding at the freezer.

New products have long had an advantage in that their labels are new and up to date. It is the old products that must occasionally "hire themselves some salesmen" to keep pace with their shelf competition.

The most powerful salesman in the self-service revolution has proved beyond all doubt to be the label. Never was it more important or profitable to employ the best in design, techniques and materials.

DESIGN, ROBERT C. NEUBAUER, INC.

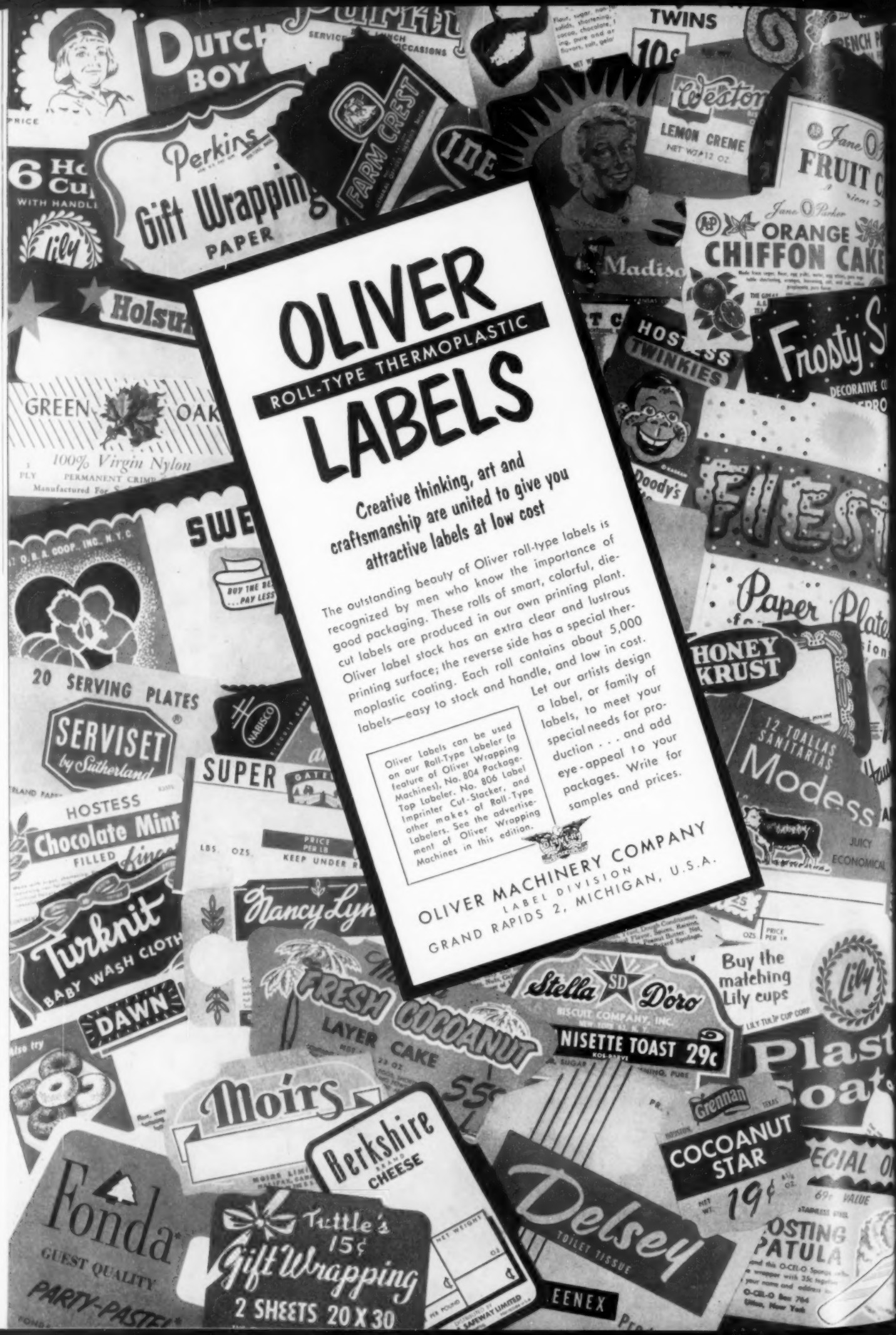


Quality and precision of anti-freeze is interpreted in rifle-bore design.

PHOTO COURTESY MERIT DISPLAYS, INC.



Potent new selling team is vacuum-formed display dome and label card.


OLIVER
ROLL-TYPE THERMOPLASTIC
LABELS
Creative thinking, art and craftsmanship are united to give you attractive labels at low cost
The outstanding beauty of Oliver roll-type labels is recognized by men who know the importance of good packaging. These rolls of smart, colorful, die-cut labels are produced in our own printing plant. Oliver label stock has an extra clear and lustrous printing surface; the reverse side has a special thermoplastic coating. Each roll contains about 5,000 labels—easy to stock and handle, and low in cost.
Let our artists design a label, or family of labels, to meet your special needs for production . . . and add eye-appeal to your packages. Write for samples and prices.
Oliver Labels can be used on our Roll-Type Labeler (a feature of Oliver Wrapping Machines), No. 804 Package Top Labeler, No. 806 Label Imprinter Cut-Stacker, and other makes of Roll-Type Labelers. See the advertisement of Oliver Wrapping Machines in this edition.
OLIVER MACHINERY COMPANY
LABEL DIVISION
GRAND RAPIDS 2, MICHIGAN, U.S.A.
Dutch Boy
Perkins
Gift Wrapping
PAPER
Farm Crest
Weston
LEMON CREME
TWINS
Jane Parker
ORANGE CHIFFON CAKE
FRUIT
Lily
6 Hot Cups
WITH HANDLES
Holsum
GREEN
OAK
100% Virgin Nylon
PERMANENT CRIMP
Hostess
TWINKIES
Frosty
FIESTA
Paper Plates
HONEY KRUST
20 SERVING PLATES
SERVISET
by Sutherland
HOSTESS
Chocolate Mint
FILLED
Turknit
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DAWN
SUPER
Nancy Lyn
FRESH COCOANUT
LAYER CAKE
Stella D'oro
BISCUIT COMPANY, INC.
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Buy the matching Lily cups
Lily
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Modess
JUICY
ECONOMICAL
Moirs
Berkshire
BRAND
CHEESE
Fonda
GUEST QUALITY
PARTY-PASTEL
Tuttle's
15¢
Gift Wrapping
2 SHEETS 20 X 30
Delsey
TOILET TISSUE
Grenman
COCOANUT STAR
19¢
EENEX
POSTING PATULA

able-stik
NON-MOISTENING
labels



aid BARCLAY in
telling and selling

Barclay Mfg. Company recognizes the values of identification of product and brand. They know, too, the importance of efficiency of application which explains why ABLE-STIK *pressure sensitive* labels were selected. ABLE-STIK offers the most modern, low cost method of labeling.

ABLE-STIK has an affinity to most surfaces . . . wood, metal, glass, plastic, rubber, composition . . . is easy to apply and equally easy to remove, without fuss or muss . . . requires no heat, water or glue for application . . . will stay in place until purposely removed.

You are cordially invited to join the growing number of manufacturers who are using ABLE-STIK, the modern method to apply and identify. ABLE-STIK is available either individually cut, die cut or in rolls for machine dispensing.

Our design and counsel services are available at no obligation or cost to you.





**For mass production operations we offer electric dispensers to deliver the label completely freed from the backing and ready for immediate application. A demonstration is yours for the asking.*





Ask for "Blue Print to Modern Labeling" and our kit of ABLE-STIK samples.



allen hollander co., inc.

385 GERARD AVENUE NEW YORK 51

MOtt Haven 5-1818

MAKERS OF ABLE-LABELS FOR EVERY PURPOSE - GUMMED, UNGUMMED, THERMO-PLASTIC, DIE-CUT, EMBOSSED

Labels: types, uses, functions

The principal types of labels are wrap-around, spot and direct imprinting on the package or product. Paper is the favorite basic medium for labels because its properties can readily be adapted to various finishes and processes. Different combinations of paper and metallic foils achieve interesting and artistic effects.

Most pre-formed labels applied to the surface of a product or package are put on with adhesives and depend for their permanence upon the rigidity of the surface to which they are affixed. In recent years, thermoplastic labels have come into widespread use on certain containers or wraps, such as those used for bakery products, pharmaceuticals, beverages and pre-packaged meats. These labels, coated with a plastic resin, are heated to activate the adhesive properties of the resin and are applied at speeds ranging from 75 to 300 a minute. Faster output all along the packaging line results. Also, problems of down time and maintenance often are reduced by the so-called method of dry or heat-seal labeling.

In addition to the conventional pre-formed label, there is a special group classified as seals, tags and bands. (See "Seals and Tags," p. 608.) These serve a variety of purposes, from informative labeling (seals and tags on electric appliances) to prestige labeling (booklets or gift cards attached to fine wines, perfumes, jewelry, gift items, etc.).

Direct-imprint labeling involves lithography (printed coffee cans, collapsible tubes); silk-screen printing, decalcomania and printing with thermosetting enamels (beverage bottles, cosmetic jars); and stamping, molding-in and similar graphic-arts processes. (See article on "The Printing Arts," p. 558.)

The user of labels has many techniques and processes at his command through consultation with the label manufacturer. A brief discussion of some of these processes follows.

Varnishing adds brilliance and permanence to a label, protecting it from soiling and thus prolonging its effective life. Lacquer has additional qualities which give it a definite value for some types of labels. Spot varnishing may be applied during the printing process.

Foils and laminated papers are adapted to special uses. A manufacturer of household cleanser has found, for example, that a foil label provides excellent protective qualities as a water-vapor barrier and at the same time affords new attractiveness for the package. Laminated labels with an acetate surface give protection against soiling. This can be important in merchandising items in the cosmetic, drug and pharmaceutical lines, which may not move fast and which may have to be marked down or returned if labels are soiled.

Embossing, a form of bas-relief, gives the appearance of three dimensions and produces a feeling akin to the sensation of touch. Embossing is an important process for enhancing the artistic effect of packages containing candy or cosmetics, since embossing can add greatly to the suggestion of quality and luxury. A specialized form of embossing called "pebbling" can be used to add character to the background in a label. This process also helps to assure adhesion to the smooth surface of the glass container.

Metallic inks and dusting powders are often used to accentuate parts of the label design that are susceptible to such treatment. Gold and silver effects are thus obtained.

Pictures. Labels for food products which are expected to have appetite appeal are usually designed with a pictorial representation in natural colors. Frequently this is accomplished by a picture of a dish prepared from a recipe. Color photography, reproduced by four-color processes, enables the artist to obtain effects which markedly increase the sales appeal of packaged products.

Cans. Many specialties are packed in decorated metal cans when the prospective use and volume distribution of the container can be considered permanent and readily anticipated. Coffee is a conspicuous example of a product packed in a lithographed can. However, packers of



LABELS, THE NEVINS CO.

Wrap-around paper labels permit excellent brand and product identification but allow the glass containers to show off the product to advantage. Lithographed lug-vacuum caps also take on an important part of the labeling chore.

Brilliant Beauty

in labels by CAMEO



foil
paper
die cut
printed
gummed
heat seal
embossed
thermoplastic
pressure sensitive

CAMEO
DIE AND LABEL COMPANY
154 WEST 14th STREET, NEW YORK, N. Y.
ORegon 5-0228

Seal and Label

In Canada: Cameo Crafts Inc., 157 St. Paul St. West, Montreal 1



PHOTO COURTESY MURSON LABEL CO.

Paper spot label is teamed up with applied color decoration, providing smart merchandising and re-use.

food products subject to seasonal variations in quantity, grade and geographical distribution find it more convenient to adjust quantities through the use of paper labels. Stocks of cans are therefore unlabeled until the season's crops and destinations are known to the purchaser. When packed, these canned foods are stored, unlabeled, until bought by dealers, who furnish the labels for their private brands.

Special grades of paper are used for can labels. The stiffness and permanent flatness of the paper have a certain relationship to the direction of the grain, as well as to the size and shape of the label. The label papers which are to be varnished, embossed or otherwise treated by the graphic-arts processes are selected because of their suitability for a specific use.



END LABEL, POLLOCK PAPER CO.

All copy for this cellophane-wrapped loaf appears on two paper end labels—visibility does the rest.

The display panel is that part of the label which is ordinarily exposed when the produce is offered for sale. In a cylindrical container, the display panel occupies about 40% of the circumference.

The space at the right of the display panel, commonly known as the side panel, comprising about 20% of the circumference, may be legally used to supplement the display panel, provided the required statements are contiguous to the display panel and sufficiently conspicuous in comparison. Furthermore, the side panel, if used for this purpose, should not be cluttered by words or designs that are irrelevant.

There are several jurisdictions having authority over the use of label space. The Federal laws naturally have the widest coverage, but there are state laws and even local ordinances that must be considered in the labeling of various commodities offered for sale in package form. (See tables on Federal and state agencies regulating packaging, pp. 38 and 42.)

Subject to these legal limitations mentioned, the display panel usually includes the brand name or trademark identity, the name of the product and its description if required by official standard and the quantity of the contents. The name and address of the manufacturer, packer or distributor may be placed on the display panel or on the adjacent side panel.

The back panel is frequently called the consumer panel and is used to:

1. Give information about the product, selection of ingredients, methods of processing, various uses, size of can, number of servings, etc.
2. Sell other items in the line.
3. Provide recipes in type form that can be changed easily.
4. Display four-color advertising messages to consumers, for example, illustrated food servings that lead to wider use of the product and help the housewife with her eternal problem of meal planning.
5. Present dietary information about vitamin and mineral contents and facts that help to sell "health."
6. Offer coupons, prizes and premiums, or guarantee product quality.
7. Convey information in foreign languages, as well as in English.
8. Display exposition medals and awards of merit, endorsements and seals of approval.
9. Tie up with advertising, radio promotion and sales display.

Side panels, if not used for required statements, may be used for listing related products in a company's line or similar information. Not only is this good merchandising, but also it can serve as a design stabilizer to help keep elements in the front and back panels from "floating" or merging.

Circular top-of-can labels are sometimes used to achieve display impact and provide space for salesmanship devices, such as money-back guarantees, recipes and suggestions for use, but circulars accompanying the product at the time of sale are in the same category as labels so far as statutory limitations are concerned.

Glass containers offer natural opportunities for the display of the actual contents, especially in the case of fancy fruits which are packed whole. Glass containers may use wrap-around bands or spot labels.

With spot labels, the adhesive is spread over the entire surface which comes into contact with the container. The adhesive is applied by the labeling machine, or pre-gummed paper is used. In using spot labels, the quality of the adhesive is quite important.

Labels for plastics. Pressure-sensitive labels and also the heat-sealing type may be used for plastics. However, there are many formulations for coating various types and proper selection must be made to assure adhesion. The delayed-tack type of heat-sealing label can be used in many instances with success, because it stays tacky long enough for the label to be applied. Pressure-sensitive and heat-sealing types of labels can be obtained either printed or plain and can be made from many materials, such as paper and cellulose acetate. For some articles made of plastic, wrap-around labels are likely to be more effective than spot labels.

Labels for cellophane may present a special problem for high-humidity application, inasmuch as all cellophanes have the capacity for absorbing large amounts of moisture if continuously exposed to high humidity. The rate of absorption is much greater in highly plasticized and uncoated grades. Even the coated cellophanes will absorb sufficient moisture under some circumstances to cause a lifting or loss of adhesion of the heat-sealing and moistureproof coating. Under these conditions, it is necessary to use the so-called "anchor" type of coated cellophanes, which are able to absorb

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FLASHMANSHIP!

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How to put **foilcraft** *FLASHMANSHIP!* in *your* product

Write for "samples of foilcraft Flashmanship"—a free booklet of actual labels, tip-ons, seals, wraps, displays used in your trade, each using "salesmanship in foil" as its theme.

Flag sales attention to your product with the glitter of foilcraft "Flashmanship" . . . adapt its eye-catching sparkle to your labels, seals, wraps, tip-ons, displays or complete protective over-wraps. It costs so little to add the sales flavor of foilcraft to your product. Our design and merchandising departments can show you how, at an amazingly low quote!

FOIL craft

FOILCRAFT
PRINTING CORPORATION

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GEdney 6-4516

Cincinnati, Ohio
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MElrose 8963



Important trend in labeling non-food items for supermarket sale involves color labels featuring end result and appetite appeal.



Label for Chamberlain's "Golden Touch" hand lotion blends with the graceful lines of the container and closure.

this moisture and remain exposed to water without so great a loss of coating adhesion. The homogeneous films, such as cellulose acetate, do not present this difficulty because they have a lower absorption for moisture and there is no coating to lift off. Also, the formulation of the coatings on thermoplastic labels may be such that water or high moisture content can cause them to lose adhesion and lift from the plastic film surface.

Stickers are often applied to individual vegetables and fruits to advertise the ranch or farm where they are grown. Stickers made from greaseproof paper are used for packaged meats. There is no doubt that such information establishes product recognition, ties in with advertising and helps to build up repeat orders.

Product-type labels

Tobacco products must be labeled with the license number of the factory at which the excise tax was paid. Most cigars are labeled with a band, more or less ornate, to identify the brand. Tobacco containers must carry labels designed for immediate identification, since the customer calls for tobacco products strictly by name. Cigarette wrappers, called "cups," are labels because they carry all the information required.

Confectionery and chewing gums are usually packaged by mass-production methods and therefore need precision labels as well as identity and attractiveness. These products are in the category of packaged goods which are required by law to carry a statement of their ingredients.

Bakery products. Spot labels of the heat-seal roll type are used with good effect for labeling bakery products. Scientific planning of such labels for family design and color schemes that do not clash with the product color are important in promoting brand information and sales appeal.

Industrial products. Attractive and effective labeling is important for industrial products, even though keen point-of-sale competition may not be a primary factor. Brand names, trademarks and designs that are readily identifiable can help to make the distributor's job easier and at the same time give customers the impression of precision and quality.

Dyed textiles need a certain kind of labeling which is peculiar to this kind of merchandise. It can be readily appreciated that a color which is fast to washing is not necessarily as fast to light or to crocking or to other color-destroying agencies. Fabrics are designed for the use to which they are to be put. If fabric is likely to be used for some other purpose than the one for which it was meant, then full warning should be given to this effect.

Appliances and similar products are often labeled or tagged to provide special information, such as the manufacturer's serial and model code numbers, replacement and service data, and copyright or patent notice. Such labels may also bear an institutional message or tie up with the maker's advertising and promotion.



Problem of distinguishing new and rebuilt fuel pumps is solved by reversing carton color combinations.

Miscellaneous types

The so-called "convenience labels" make no attempt to describe the contents of packages or the articles to which they are attached. Address labels are a familiar type and there are innumerable "message" labels or stickers which serve a useful purpose.

Stock labels in semicomplete form enable small distributors to avoid the expense of special designs and, at the same time, obtain quick delivery of quantities to suit their immediate needs. By imprinting a few additional details, stock labels can be made ready for use in less time than it takes to prepare special labels.

Folders or circulars which accompany articles at the time of sale are in the category of labels, though not necessarily attached to the articles. Even where the circulars and the goods are shipped separately, the Supreme Court has held that the common origin and destination of both circular and product produce a situation which defines the circular as a label.

Batch identification is desirable when the quality or integrity of a product is likely to be a matter of special importance. Provision is usually made for identification of the lot number and date of manufacture by using some code-marking device.

Endorsements by various publications and trade associations are evidenced by certain prescribed legends. Seals of the American Medical Assn. of *Good Housekeeping* magazine and *Parents' Magazine* are well-known examples.



Heralding

IN 1956

Foxon's 40th year as a leader
in the design and production
of foil labels, seals and tags
and
looking forward to the even
greater advancement of the
packaging industry as a whole
to
which we shall contribute...as
always...the newest and most
effective techniques in our
field, justifying our reputation
as

"America's Finest Foil Printers"

THE FOXON COMPANY
PROVIDENCE 1, RHODE ISLAND



• your production men

Production lines keep rolling — no delays for lengthy label preparation, spoilage, or poor adhesion. Labels go on fast . . . clean . . . easy — no water, no glue, no heat, no mess!

everybody's happy . . .



• your dealers

Pressure-sensitive labels *stick tight* on any hard, smooth surface. Regardless of heat, cold, or humidity, they identify your brand . . . tell your product story . . . help make sales.

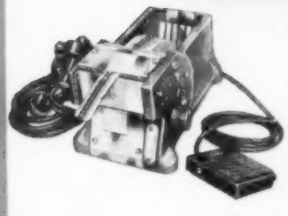
when you use

• your customers

Buyers like these peel-off labels that won't "pop" or pucker . . . yet remove easily without soaking or scraping.

Special Roll Label Dispensers save time and money in every volume labeling application.

ROLL-DISPENSED Pressure-Sensitive LABELS



WRITE TODAY for FREE TEST-IT-YOURSELF KIT

Contains a selection of pressure-sensitive samples for on-the-spot testing in your own plant.

Your own Roll Label Printer is a *specialist* who can design and produce roll-dispensed pressure-sensitive labels that sell on your product or package. Any size . . . any shape . . . on almost any stock. Consult him on any of your labeling problems. He will be happy to cooperate.

KLEEN-STIK PRODUCTS, INC.

7300 West Wilson Avenue • Chicago 31, Illinois

Pioneers in Pressure Sensitives for Advertising and Labeling

Merchandising check points

The following check points will be found useful in analyzing the merchandising requirements, characteristics and potentials of a package. Obviously, the wider the area of distribution and the more varied the types of outlets, the greater become the complexities of the merchandising factors to be taken into account.

A. The product:

1. Is this a new product?
2. What—how many—are its uses?
3. What is its relative quality competitively?
4. What are the special sales points or features?

B. The market:

1. Who are the ultimate consumers—age, sex, income bracket, social-cultural level, races, geographical locations, export markets?
2. The distribution plan—
   a) Regular channels—wholesale and retail:
      (1) Independent stores (2) Chain stores
      (3) Self-service or supermarkets
   b) Mail order
   c) Direct selling (house to house)

C. Buying habits:

1. What are the retailer habits or practices with respect to products of this character—
   a) Unit of purchase?
   b) Storage prior to placing on sale?
   c) Display on shelf, counter or window?
      (1) Is shape and size of package adapted for mass display?
      (2) Is single unit attractive?
      (3) Will package be seen above and below eye level? Which panel displayed?
      (4) Will the retailer support the product?
      (5) Will supplementary or point-of-sale support be given?

D. Size considerations:

1. Are package sizes properly adapted to— a) Distribution methods? b) Consumer habits?
2. How would changes of size affect— a) Consumer convenience? b) Quantity of purchase or use?

E. Competition:

1. Have you compared product itself with competition, direct and indirect?
2. Have you compared packages—
   a) Material used?
   b) Sizes and shapes, colors and designs?
   c) Features—desirable or undesirable?
3. Should your package resemble competing packages, or be distinctively individual—from viewpoint of manufacturer, retailer, consumer?

F. Package appearance—for identity:

1. Are all necessary features incorporated and are they treated properly with respect to relative position and emphasis?
2. Is brand name unmistakable in position, style?
3. Does package adequately feature trade name?
4. Is name of manufacturer given due prominence?
5. Is product name (as distinguished from brand) featured to give immediate product identity?
6. Does it—or should it—use a "family" design?
7. Does it reflect—
   a) The outstanding qualities of the product?
   b) Integrity and responsibility of maker?
8. Is tie-in with advertising possible?
9. Is package suited for effective use on TV commercial?

G. Package appearance—for information:

1. Is all information required by law included and in a manner acceptable for Federal, state and foreign distribution?
2. Are there any special regulations, local or other, that must be observed, such as accurate capacity, sterility of material, etc.?
3. Are instructions and uses legible and clear?
4. Is it possible to clarify—shorten—improve—the directions or instructions?
5. Do the illustrations serve to instruct, interest or attract the consumer?
6. Should a blank price panel be provided?

H. Package appearance—for inviting attention:

1. Are colors and design—
   a) In good taste?
   b) Appropriate for product, retail outlet and consumer?
   c) Comparable with competition?
2. Does the package make a strong impression—
   a) From a distance?
   b) From a closer view?
   c) On shelf, counter or in window?
   d) In consumer's home?
   e) If purchased for a gift?
3. Does it carry a self-selling story?
4. Have all the pros and cons of visibility package material been weighed?
5. Does the package have remembrance value?
6. Is it a self-sufficient advertising unit, or must it depend on other advertising?



* designed and printed by

Jonrico
INC.

438 WEST 37TH ST.
NEW YORK 18, N.Y.



PRINTING, EMBOSSING AND GOLD BRONZING ON LABELS AND FOLDING CARTONS

Seals and tags

by PETER A. SCHNEIDER*

Seals and tags have made remarkable progress in the field of packaging accessories that sell. Recognition of their value started to build up 25 years ago, when packagers and merchandisers sensed the inevitable trend to self-selling.

In the early years of this development, storekeepers were slow to accept packaging tags and seals, but today retailers rely on these devices for getting product information to sales people and selling consumers at the point of sale. Currently the thinking of packaging executives is directed toward developing more effective point-of-sale tags and seals.

Selection of the packaging device, as between seal and tag, is determined by the nature of the product and its packaging requirements.

Seals

Packaging seals, as contrasted with labels, are gummed or ungummed paper devices characterized by an embossed edge, with part of the design embossed, part debossed. Seals are produced by dies that print, emboss and die cut in a continuous series of operations. Technically this device is called a "French-edge embossed seal."

The term *seal* is sometimes used when referring to a flat label which performs the function of sealing as a closure, as a decoration or as a symbol of authority.

The functions of embossed seals are trademarking, product identification and point-of-sale advertising. Seals are effective, informative selling devices when they give reasons to buy and instructions on care, use, handling. Often they contain copy regarding ingredients or fibre content as required by law. Some seals carry warranty or guarantee statements; some give safety precautions.

An embossed seal, properly designed, provides a beautiful, dignified selling medium when the package, or the product itself, lends itself to direct application of a seal—as on bottles, jars, fancy boxes, some textiles, hosiery, clothing and the like.

If embossed seals are selected as your point-of-sale representatives, it will pay in the long run to think about embossed-seal adhesion before specifications are written. This is the best insurance that the seal will stay with the merchandise at the place where it is expected to do its part in selling. For example, sometimes the container surface is resistant to standard water-moistened adhesives. In such cases a special adhesive is recommended. In any event embossed seals require expert designing, particularly with regard to embossing, so that the adhesion will not be impaired.

Where there is direct contact between the seal and a textile surface, consideration should be given to peelability of the gumming as well as to its adhesiveness.

Where the seal is intended for contact with animal or vegetable surfaces, such as poultry seals, special-formula gummings are recommended.

Where contact with certain plastic, lacquer-finished and varnished surfaces is encountered, gumming should be carefully tested before writing the specifications.

Paper for seals. Basic considerations in paper selection for a seal are: (1) the right body stock in relation to use, application and production; (2) a suitable surface finish in relation to use, design and production.

An excellent range of materials is available to those who select embossed seals as a packaging device. Metallic foils provide brilliant effects so often sought in creative packaging. Pyroxylin-coated metallics give the velvety, lustrous finish that complements certain products so effectively. Pyroxylins in white and colors provide clean, shiny backgrounds which set off a wide variety of motifs.

Design. It is easy to understand why designing seals for packaging calls for specialized skill. The seal must be attractive, legible, distinctive and in good taste. It must be designed with an accurate knowledge of machine limitations, making use of embossing and the right combination and distribution of colors to obtain brilliance, harmonious balance and visibility from all angles. It is customary to make the design on the actual material on which the seal will be printed, and in actual size, averaging three or four square inches. In this small area considerable copy is often desired and that copy must be fitted

* Dennison Mfg. Co., Framingham, Mass.



Tags carry essential how-to-use-and-care-for information. Increasing trend to self selection now imposes a major selling role on tags.

Your Product... a shrinking violet or...

AN EYE STOPPER





Your Product

needs plenty of Eye Stopper impact in today's fast moving markets . . . to fight for attention and start the sale. **Dennison**-designed seals and tags can give that STOP and BUY impact to your product.



Look to Dennison

TELEPHONE DENNISON OFFICES IN PRINCIPAL CITIES, OR WRITE **Dennison** MANUFACTURING CO., SALES DEPARTMENT, FRAMINGHAM, MASS.
IN CANADA — DENNISON MANUFACTURING CO., OF CANADA LTD., DRUMMONDVILLE, QUEBEC



Label problem for gift decanter is solved with a foil shield that doubles as a label and an appropriate decoration.

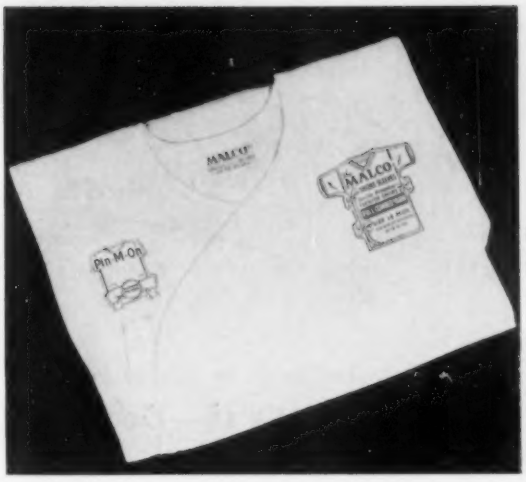


PHOTO COURTESY DENNISON MFG. CO.

Seals explain, describe and sell garments at a glance. They attract attention and provide an air of prestige. Seals are a *must* for certain items seeking distribution in self-selection outlets.

in without detracting from the effectiveness of the seal.

Tags

The first marking tags made in the United States were produced in the early 1850's by E. W. Dennison. These tags marked the beginning of informative labeling—a vital factor in the ensuing development of large-scale retailing in this country.

Marking tags are advantageous packaging accessories for many products. Moreover, they offer splendid opportunities to the manufacturer of a product component whose item ordinarily is not branded or identified. For example, a maker of lamp cords for a lamp of different manufacture) effectively identifies his product with a tag stating the cord is a mark of the lamp's quality and craftsmanship.

The physical contour of a product may lend itself to the attachment of a marking tag by a cord, ribbon or wire. Dangling from the product, it invites the shopper to reach for it and read its message.

In this connection it is advisable to consider the length of the tag cord from the standpoint of display value as well as from the standpoint of speed in the attaching operation. Construction and weight of cord, as well as color in relation to tag and product design, are things to think about in the planning stages.

Packaging tags can be reinforced with a paper patch or metal eyelet and equipped with extra-strength tag twine or wire for attaching. This is desirable where the product is destined for continuous handling at the point of sale.

There are a number of devices for attaching the tag to the package. One practical type has a clasp built into the tag. This clasp device can be snapped on products that have handles or looped projections, such as pail or luggage handles and zippers. It can be attached to products that are wrapped in burlap or other strong textile coverings.

Several methods of attaching are provided by operations such as scoring, dieing out, punching, slotting, notching. For example, button slots offer a practical method of attaching the tag over buttons of clothing or other button-shaped protuberances. Ingenious slots allow attachment to the edges of textiles, handkerchiefs, hosiery and similar flat goods.

Construction. The desirable features to look for in tag stocks are:

1. A smooth finish which is adaptable to high-grade printing and to imprinting, stamping or writing with ink or pencil.
2. Brilliance of color and uniformity of shade.
3. Strength of stock commensurate with handling requirements.
4. Stock that is rigid and yet flexible, so that the tag can withstand handling throughout distribution.

Since various grades of tag stock are available in a wide price range, there is always the temptation to permit price to dictate the selection. However, price buyers soon learn that a cheap-looking tag has an adverse effect on the appearance of the merchandise whereas quality pays.

Special finishes may be applied to packaging tags for the purpose of protecting the surface and to enhance the appearance of the tag. Nothing but a demonstration can do justice to the way a tag is improved in appearance value by the modern method of lacquering over the tag surface after printing.

Lacquering may be applied on one side or on both sides of the tag; it may be applied with full coverage or in stripes. Some tags are produced with only part of the tag lacquered so that price or other information can be written in easily.

Standard inks used on packaging tags are those used commercially for high-grade printing. They are usually satisfactory for normal handling through distribution channels. Some products and packages are subjected to unusual conditions, however, making it advisable to consider whether or not the tag printing requires safeguards such as those provided by inks that are fadeproof, moisture resistant, greaseproof or non-toxic.

Copy, layout, design. The primary purpose of packaging tags is to sell the product. Tags will sell effectively if they have selling qualifications. Once the shopper takes hold of the tag and starts to read, the tag has about one minute to do its job.

Before any designing is done, the packager should make a clear-cut outline of the most important features of the product from the standpoint of the user. He should get reactions to these selling points from people who are typical of the market. Then he should boil these points down to the fewest words in which they can be expressed clearly. Use simple, straightforward statements that depict satisfaction, pleasure, comfort, ease and pride of ownership. That is the copy to submit for layout and design.

Specify type large enough so that your selling points are legible even to the myopic housewife who leaves her glasses at home when she shops.

Advertisers' index by subject matter

for SECTION 16—Decorative packaging

Listings do not necessarily cover entire line of advertisers nor all producers in each category.

DECORATED METAL CONTAINERS

Atlantic Can Co. 625
I. D. Company 616

DECORATIVE PACKAGING PRINTS

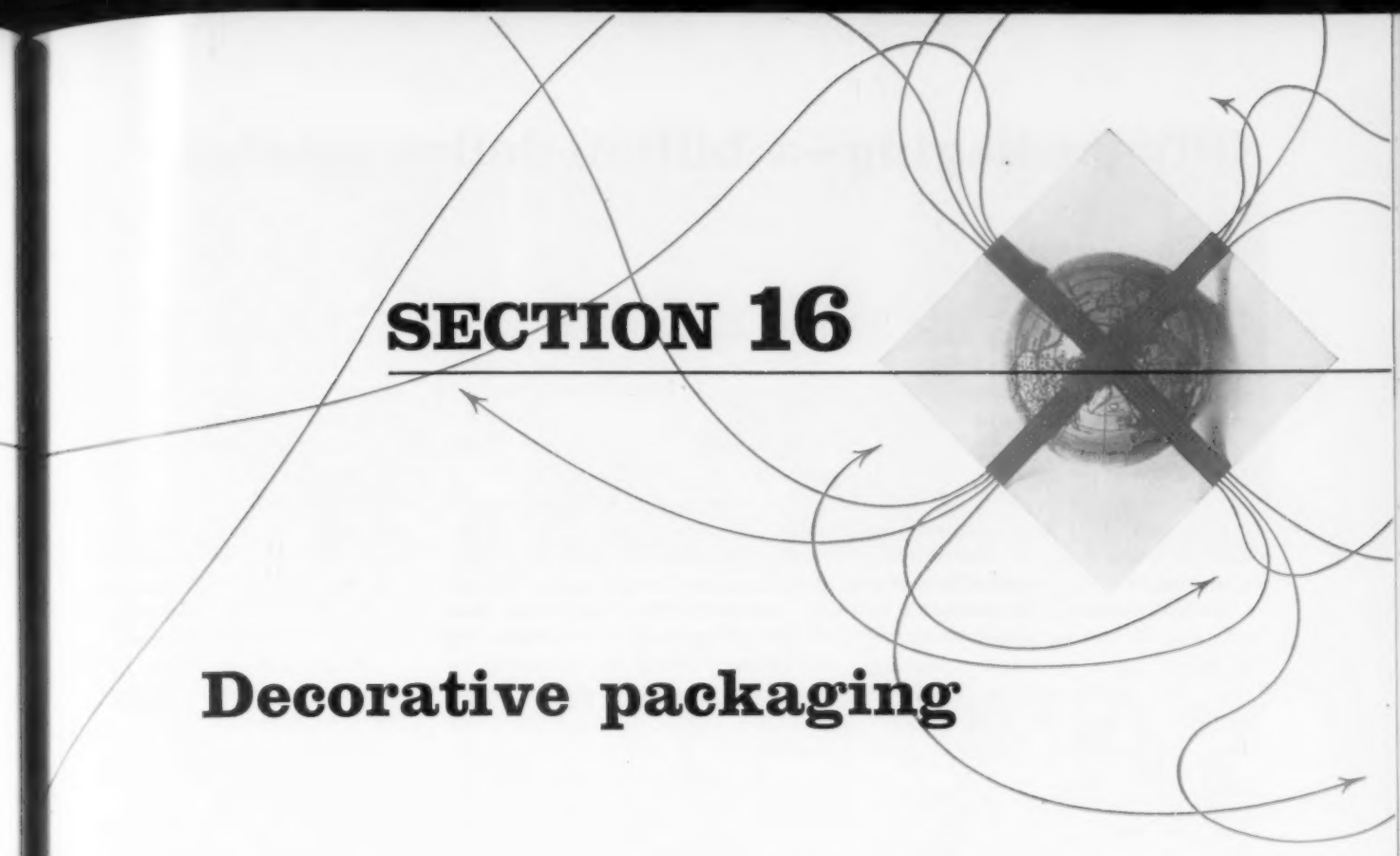
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SECTION 16

Decorative packaging

Gift Packaging—A Billion-Dollar Market 614

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Gift packaging—a billion-dollar market

Gift packaging is no longer a matter of a few frills to dress up a product and capture a little extra seasonal business. In many product fields, it is real, year-round big business—an integral part of the entire merchandising program.

To get a proper perspective on the vast market, it is only necessary to take a quick look at the nation's vital statistics. The population of the United States today is estimated at 163,000,000 persons. Every year each of them has a birthday. Assuming that each person gets at least one birthday present, the total is more than half-a-million birthday gifts every single day.

The annual birth rate of 4,000,000 baffles the sociologists and economists. To assume that each baby born receives just one baby gift is probably a gross understatement. Add to this the shower and wedding gifts to some 2,000,000 brides; gifts to 35,000,000 couples observing wedding anniversaries; some 5,000,000 students graduating from schools, colleges, universities and professional institutions, plus Christmas presents, Easter presents, Valentine presents, bon voyage presents, hostess gifts, gifts to friends in hospitals, gifts for Mother's Day and Father's Day (there are 19,000,000 mothers and 19,000,000 fathers) and scores of other occasional remembrances exchanged by a nation of 160,000,000 persons and the total merchandise purchased as gifts reaches almost astronomical scale.

The demand for appropriate packaging of these billions of dollars worth of purchases is as deeply woven into American living habits today as the custom of gift giving itself. And proper gift packaging has become the determining factor in thousands of purchases. It makes a shopper buy a particular box of candy, a particular combination of cosmetics, a certain cigarette lighter, a certain string of beads. Without a gift-package presentation, competing brands in the same product fields haven't a chance.

There is scarcely any class of merchandise that won't win added sales as gifts if packaged with a gift look—from foods to fishing tackle, liquor to layettes, candy to cutlery.

Gift packaging has become so general and so competitive that, to be successful today, it must be selected and designed with the same meticulous care that is given to the packaging of standard lines of merchandise. Gift-packaging techniques are governed further by rapidly changing selling methods. The almost universal swing to self service or self selection places more emphasis on display packaging, even on the counters of smart so-called service stores.

Packagers appear to be most interested in the broad basic principles that will help them adapt the thousands of beautiful decorative packaging materials to the selling requirements that mean quick-moving gift packages in specific product groups.

Today's gift packagers are trying to find the correct answers to the following questions:

What kind of gift packaging is my competition using—and how will mine stack up against it?

Is there any way for me to take the guesswork out of gift-package planning?

Will my gift package be easy for the store to handle?

How often should I redesign my gift packages? Can I repeat a successful gift package or is it better to offer a new one?

Should I plan a package suitable for year-round gift appeal or should I use strictly seasonal appeals?

Can I successfully use removable sleeves and wraps that permit the retailer to return merchandise to regular stock after the seasonal promotion has run its course?

Leading packagers agree that there is no way to eliminate guesswork completely in planning a gift package, but there are pitfalls to be avoided. It is foolhardy, for instance, to plan a closed, sealed package for an item which a customer wants to handle and which the retailer wants to show in open display. The quantity packaged and the price of the packaged item must be in line with current consumer preferences. The package must be sturdy enough for handling without coming apart. Nothing so irritates the retailer as gadget packages that need constant "fixing" or that become damaged and unsalable. An unnecessarily bulky package indicates bad planning in this day when every inch of retail space must produce a set volume of sales.

Self selling requires that almost every gift package must have maxi-



PACKAGES, STEPHEN LEEMAN CORP.

The grocery shelf is the source of many of today's gifts. Ginger in ceramic bean pot with wooden lid and colorful cellulose seal and tie; chocolate cookies in decorated imported metal container; herbs on colorful wooden wheel, and assortment of jams in gold paperboard frame, with foil labels and gold caps all achieve new status through their original, attractive packages.

PHOTO COURTESY DENNISON MFG. CO.



BOX, S. H. DAVIS PAPER BOX CO.; GLASSES, LIBBEY GLASS.



PHOTO COURTESY LANCOME SALES, INC.



Container that provides stage setting for watch (left) makes all-out bid for the gift dollar. Gold-leaf printing and pleated satin background heightens effect. Decorated glasses (center) help remove any doubts shopper may have about golf balls as a gift. Perfume bottle is faceted like diamond in satin-covered, satin-lined case (right) for ultimate in gift values.

mum display potentials. The shopper will often pass up one item and choose another among competing gift lines such as stationery, specialty foods, confectionery, cosmetics, simply because a certain gift package stands out from the others. And the shopper's choice is much more likely to be determined by the package of a gift purchase than of a standard item where familiarity with brand is one of her strongest guides.

It is difficult for firms which distribute gift-packaged merchandise in a variety of outlets to pre-test their packages. Many firms rely on the reaction of their salesmen because of their knowledge of actual selling environment. One candy manufacturer shows a new package to all his employees. If more than 50% like it, he feels reasonably sure it has general appeal. If less than 50% like it, he does not adopt the package. The successful nationally distributed gift package today is probably a combination of a little guesswork, a lot of experience and the avoidance of known undesirable characteristics, plus a well-calculated spirit of adventure about trying something new.

General practice in most merchandising is to continue a successful item from one season to the next. This, however, may not apply to a gift package. Cosmetic manufacturers were among the first to discover that there's got to be a "new look" with every promotion, even though the item may be the same. Retailers like items that create enthusiasm among sales people. A package that is repeated is apt to be considered "old stock,"—something the manufacturer couldn't get rid of last season.

The appeal of "something new" is universal and it is felt in gift packaging for nearly all fields. That jewelry, stationery, confectionery and household textile firms are aware of it is indicated by the many announcements of new gift packages at least once a year, and in many cases, for each seasonal promotion. The cigarette companies redesign their Christmas gift cartons each year. The liquor industry today is almost as ambitious in gift packaging as the cosmetic industry, judging by the elaborately printed and decorated cartons, the use of expensive decanter bottles, and more recently, the "server" package, introduced for Seagram's V. O., and already copied by one other firm.

Whether a gift package should be planned for year-round appeal or for the seasonal promotion—Christmas, Valentine's Day, Easter, Mother's Day, Father's Day, etc.—is entirely a matter of meeting the requirements of the merchandising program of the product. The gift package to fit any occasion is economical and retailers are not stuck with outdated stock. *(This article continued on page 616)*

PHOTO COURTESY CONGRESS PAPER BOX CO.

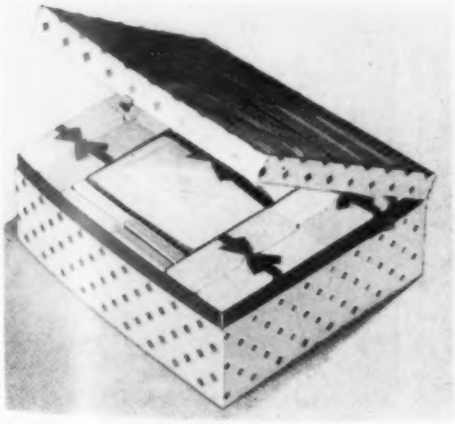
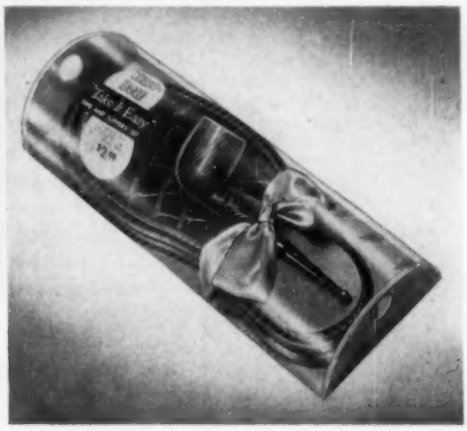


PHOTO COURTESY MILPRINT, INC.



PHOTO COURTESY ACETATE BOX CO.



Padded green satin inset lid on foil-covered box (left) for stationery is eye-appealing gift. Valentine and Christmas sleeves (center) holding three regular plastic-cylinder sock packages became successful promotions. Pipe and slipper combination (right) in specially designed transparent acetate and paperboard package rolled up a more than satisfactory sales record.

Decorative Packaging Prints

Select a suitable print to add to the appearance of your packaged candy, stationery, greeting cards, fruit cake, cookies and similar products. There's a wide assortment of pictorial and seasonal prints to choose from, all part of the extensive Mansell line, imported from England.



Sizes range from 2½″ × 3½″ to 12″ × 16″. Just mention the sizes you need and the type of subject you prefer . . . we'll gladly send appropriate samples.

Should you have a specific print need, we probably have the proper print to fill it. Write today.

A. VIVIAN MANSELL & CO., LTD.

of London

Exclusive Representative in U. S.

MILTON A. BLEIER *CORP.*

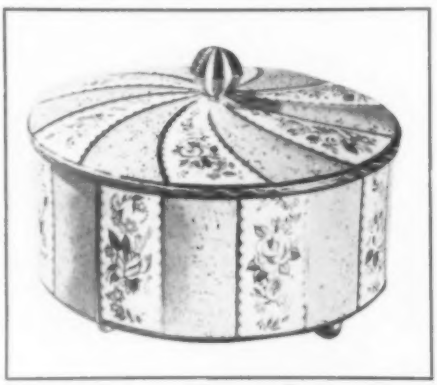
230 Fifth Avenue New York 1, N. Y. MUrray Hill 9-1352

Canadian Representative: Paper Sales Ltd., Toronto



Gift certificate by Saks Fifth Avenue uses book-type box covered with store's familiar gift-wrap paper design.

The principle is applicable to a large number of products—household items, silverware, baby items, etc. In other fields it may seriously limit the sales potential in the really big gift seasons, because it doesn't have the seasonal look desired. Seasonal sleeves or wraps that dress up standard items for the special occasions are a good compromise, particularly for large-volume items such as cigars, liquor and certain standard drug-store toiletries. Some packagers who have tried this technique say it is just as economical to prepare the special package as it is to incur the added expense of the special wrap, which involves double packaging.



Beautiful, Beautiful

BARET WARE

. . . adapted to your packaging needs

Baret Ware is one of the world's most beautiful lines of metalware . . . imported from England in magnificent colored enamel . . . some delicately embossed. Your product gains new prestige, new merchandising possibilities packaged in Baret Ware . . . and extra value too, since all Baret Ware containers have a host of re-use values. Send for information on our complete line. In addition Baret Ware can execute special orders from your designs.

I. D. COMPANY 150 Spring Street, New York 17, N.Y.

Exclusive Importers and Distributors of Beautiful, Beautiful Baret Ware



Special-occasion packages spark new sales for less glamorous products.

CLAREMONT Flock



Packaging's Magic Carpet



In its most popular end-use form, you find Claremont Flock surfaced to papers and boxboards. To achieve the various, arresting effects required by the paper processors, Claremont furnishes this Flock to the paper industry under three classifications . . . cotton — rayon — wool . . . and in a rainbow scope of colors ranging from brilliant hues to pastel shades.

These colors, carefully formulated and controlled for duplicating likeness, are dyed into the fibres during the flock manufacturing process so that a scoopful of floury Flock is a scoopful of sales-appealing color! Paper stocks coated with fascinating Claremont Flock, acquire packaging glamour—and because of the luxury they simulate, become variously identified as Velour, Velvet or Suede Papers. Papers processed with Claremont Cotton Flock are lower priced, though brilliant, are less sparkling than those cloaked with Rayon . . . Those finished with Wool Flock are hardiest. All in the hands of imaginative designers, serve as a magic carpet with which to create new package allure. Packaging interests are invited to contact Claremont. Color cards, samples and complete details available upon inquiry.

CLAREMONT
WASTE MFG. CO.
CLAREMONT, N. H.

CLAREMONT FLOCK . . . the Plush that Sells!

See Your Paper Merchant



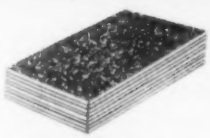
Claremont Flock-Affixed Papers — in Rolls

For these, in brilliant colors and embossed effects, we direct you to paper mills and paper merchants who process and sell Claremont Flocked papers. Available in rolls of various lengths and widths.



Claremont Flock Bulk in Dust-Tight Bags

We manufacture and supply Claremont Flock for all display and packaging purposes. Available in 50-lb. sealed-bag units. 18 colors.



Claremont Flock-Affixed Boxboard — in Sheets

For complete details, samples and prices of boxboard surfaced with Claremont Flock (in colors) — see your paper merchant. Sparkling selections available.

WRITE FOR COLOR CARDS

Decorative packaging materials

Decorative packaging uses all the standard packaging materials—paper, paperboard, glass, ceramics, cellophane, plastic, metal, wood, leather, etc., as well as tags, seals, ribbons and ties. The plus elements come from a change in emphasis. In a sense, decorative packaging makes the product—the tail wags the dog. More and more products are being promoted from the ranks of the serviceable to "giftwares" by packaging that makes the shopper regard them in a different light.

When used primarily for their decorative values, packaging materials are charged with the task of setting a mood—of gaiety, friendliness, luxury or elegance. Among the intangibles that come into play are color and design and the decorative package must steer a careful course between the traditional associations surrounding color and design and constantly changing fashions in colors and themes. A recently packaged perfume intended for women, packaged in deep apparently sophisticated color tones, moved slowly in even the most fashionable perfume departments, because the color and design had somehow overstepped a boundary, and became subject to the shopper's criticism that it "looked like a man's toiletry."

Though given a freer rein with costs, the packager of gift items still can manipulate the many materials available to fit any cost requirement.

Paperboard. The enormous range of products decoratively packaged in folding cartons, set-up boxes, fibre cylinders and corrugated constructions is testimony to the practicality of paperboard as an inexpensive and sturdy packaging material. Paperboard can be cut, stamped, scored and decorated automatically at high speeds. It adapts well to mass production. For these reasons it is chosen as the material for packaging thousands of varied retail products.

Another important paper material is molded pulp which is beginning to come of age in this country. In combination with velour, flocks and other surface treatments, molded pulp has been used successfully for inexpensive, complicated bases and platforms. In this form, the versatile molded material replaced a 10-piece construction of corrugated and scored paperboard at considerable savings to a camera manufacturer.

Fancy papers. Paper is perhaps the most diversified material of decorative packaging. It is relatively low in cost, plentiful and easily decorated. It can be laminated with other decorative materials or treated texturally in any number of ways, with printing effects in all known colors and shades. (See also "Fancy Papers," p. 78.)

Embossed glassines, quilted, waxed and featherweight corrugated papers provide protection plus ornamentation for candy, confectionery and specialty foods and for jewelry, cosmetics and toiletries. Decorative paper makes excellent cover material for many of the set-up and presentation boxes used in gift packaging, matching costly fabrics in appearance and in some treatments providing grease and waterproofness not possible using silks and satins.

Foil finds innumerable decorative applications because of its brilliance and moldability. Gorgeously printed and embossed foil papers are ideal cover stocks for many elaborate set-up boxes packaging products like cosmetic powders, perfumes and candies.

Shredded foil, like shredded film, paper and laminations, is used in food and candy packaging, where even the greaseproof cushion needed for product protection must be decorative.

Films. The transparency of films can be exploited most advantageously in decorative treatments where the product best sells itself. However, the brilliant printing developed for these materials offers special effects which combine the mirror finish of film and many bright color combinations.

Glass is the ideal decorative packaging medium for liquid products whose color or texture can be used as part of the decoration. It is especially appropriate for specialty foods and beverages, colognes, lotions and perfumes. In addition to offering visibility which lets light through translucent liquids like wine, glass refracts light from its own surface and can be blown in faceted shapes and designs that multiply the play of reflection.

Vacuum-formed plastics have entered the field of decorative packaging with containers that achieve quality textured effects imitating other materials at much lower material and production costs.

Molded plastics have contributed many decorative packages and package components. The nature of the material lends itself to virtually unlimited design possibilities which have been exploited successfully for a wide variety of luxury and non-luxury items. (See, "Molded Plastic Containers," p. 265.)

Molded plastic presentation boxes



WRAP & TIE, ARTIFICIAL FLOWER CORP.

Glittering mesh wrap and flower and ribbon tie turn regular package into a gift.

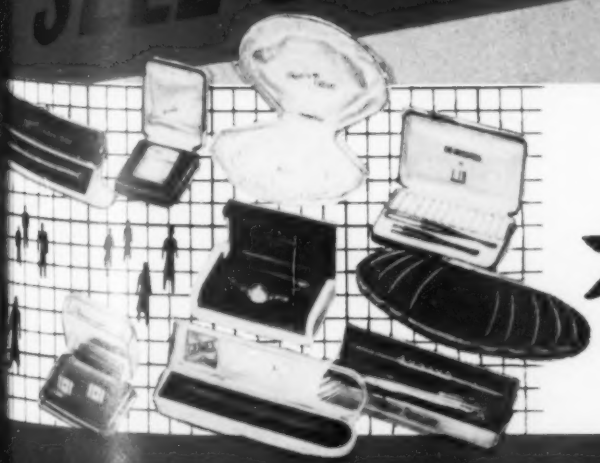
Arrow

GOOD PACKAGING

ALWAYS MAKES A

GOOD PRODUCT

SELL BETTER!





Arrow MANUFACTURING COMPANY, INC.

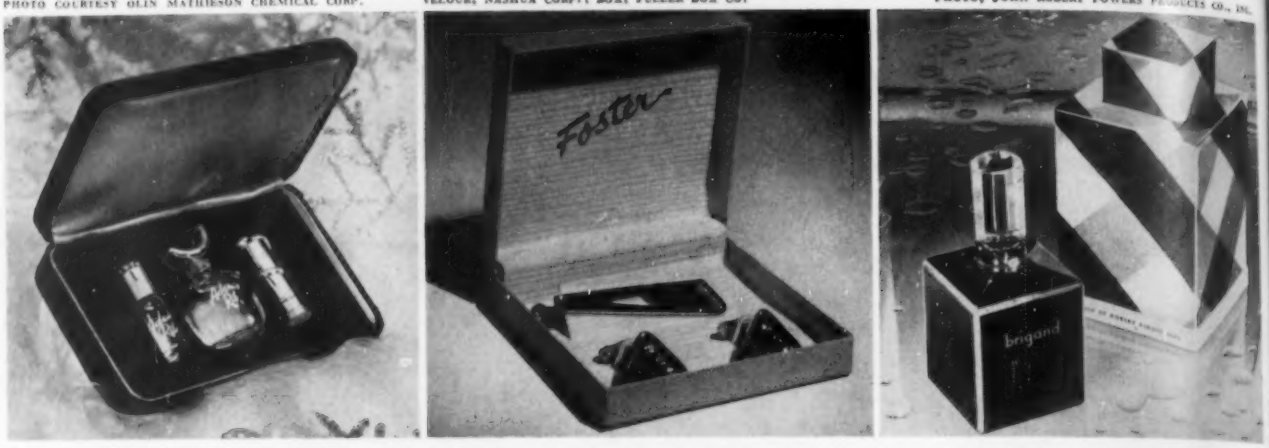
567 Fifty-Second Street, West New York, New Jersey.

CANADIAN FACTORY: 91 Brandon Avenue, Toronto

MONTREAL OFFICE: 1449 St. Alexander Street

SINCE [illegible] SPECIALISTS IN THE DESIGN & PRODUCTION OF METAL AND PLASTIC BOXES

PHOTO COURTESY OLIN MATHIESON CHEMICAL CORP. VELOUR, NASHUA CORP.; BOX, FULLER BOX CO. PHOTO, JOHN ROBERT POWERS PRODUCTS CO., INC.



Velvet-covered jewel case lined in satin (left) employs richness of fabrics to enhance appeal of perfume. Velour lining (center) adds elegance to box for men's jewelry. Bright yellow and black plaid silk (right) covering for set-up box is eye catcher for perfume package. Inside or outside the package, fabric heightens feeling of value.



JUG, ROYAL DOULTON & CO., INC.

Specially designed ceramic jug with sturdy traditional appeal is fitting container for expensive liquor.

lined with luxury fabrics serve as the gift package for watches, jewelry and accessories like lighters. They can be designed to bring out their own intrinsic qualities in a number of colors to imitate other materials such as ivory, tortoise shell, metal or wood.

Increased use of stock-molded transparent plastic packages has added sales impetus to many novelty and gift items. Direct printing on stock boxes adds a custom touch. (See, "Marking Plastic Containers," p. 296.)

Plastic closures are an important component of many distinctive packages. Stock designs in great variety carry out striking color schemes or decorative patterns, while private designs are more likely to express a trademark or product motif.

Special materials

Certain products which rely heavily on the gift market for sales volume make use of packaging media which are not always economical.

Ceramics offer some of the most charming and prized re-use containers. Each year simple variations on a few basic forms—the jug, the pot, the bowl, the vase, the ashtray, the figurine—find a favored place on retailers' shelves. Imports and domestics seem equally favored, in a full range of colors. Most of them have appeared with glazed finishes.

Metal containers, too, have high re-use potentials in addition to offering long-lived protection to the specialty foods they package. They will withstand severe handling in storage and transit. The simplest treatment can make the package decorative, with few limitations to the shape or the amount of decoration possible.

Metal can be stamped and embossed so that designs are thrown into relief, giving sculptured, encrusted or appliquéd effects to simulate carved ivory, cinnabar, mosaic, cloisonné and the like. Friction-fit, plug-in and hinge-action lids are used. Some

PHOTO COURTESY LANCOME SALES, INC.



Basket weave of glass bottle (left) suggests the flower fragrance it contains. Leather case (center) is suitably masculine for man's razor and durable enough to serve as needed re-use container. Re-use appeal is one of the chief considerations in employing decorated tin containers, which now are manufactured domestically as well as imported.

For More Sales and Profits

—Feature

TRIUMPH BRAND
NOVELTY

HOLIDAY PACKAGES

Illustrating a Triumph Brand Cellophane Stocking, as filled with mfr's. product and affixed with a Triumph Brand Topper!





CHRISTMAS STOCKINGS
(Unfilled)

NETTING

CELLOPHANE — POLYETHYLENE
VINYL — FLANNEL

The world's largest and most complete selection. Gay materials. Gala Bindings. Choice of many sizes.

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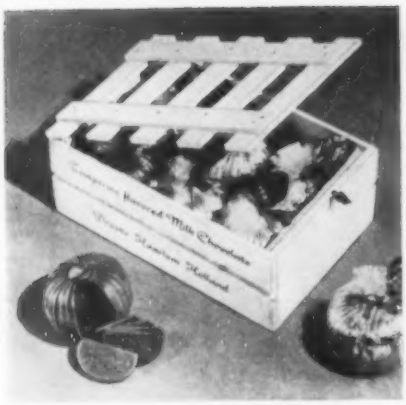
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Novel tiny wooden crate carrying imported chocolates employs both the protective and decorative features of wood.

styles are metal lined or are lacquered inside for smoother finish.

Often a general line is adapted with a minimum of effort and cost. Beautifully lithographed metal cans used in gift packaging of fruit cakes and candies are obtainable in stock shapes, sizes and designs from a number of the smaller can companies and from distributors who handle imported designs. Private designs can be lithographed where desired.

Wood packages are perennially salesworthy. For fruits, candy and other expendable products, boxes, baskets and miniature barrels can be given special effects to create exactly the feeling desired—a rough-hewn style for a rustic theme, highly polished surfaces for quality, as well as unusual designs for novelty.

Wood is used in a great variety of dispenser trays, chests, hampers and odd-shaped boxes for liquors, cheese, dried fruit and such specialty put-ups as sewing kits, spice and seasoning sets, picnic equipment, luxury games, and perfume and fine soaps.

Flock. The note of luxury supplied by any type of flock is particularly effective in packaging items like salad sets, salt and pepper shakers, men's belts or cuff links (see "Fancy Papers," p. 78). The life of low-price personal accessories can be lengthened by the user who replaces them in their flock-lined paperboard containers.

Flock is relatively inexpensive yet can be made to give the utmost in luxurious effects. It comes in a rainbow of pastel and brilliant colors from light to dark, shiny or dull, and in two-tone effects obtained by mixing flock fibres of two contrasting colors; or in fluorescent colors, by treating the fibres with fluorescent dyes. The pile may be deep or flat.

Imitation leather and fabric. Flexible plastic sheeting, notably *vinyl,* has gained wide acceptance in low-price fitted cases, pouches and covered fibre containers. Plaids and prints approximate an imported flannel or chintz; leather finishes imitate their models to the last stitch; and translucent "fabrics" in pastel shades widen the useful range.

Cloth. The success of cloth and leather imitations in plastic has renewed interest in the real thing. Cloth has a textural quality that lends itself to gift packaging.

Other popular fabrics are used to gain some specific effect—for example, monk's cloth (masculinity), ginghams (perkiness), rayons (softness and femininity), scrims and tulles (delicacy and crispness).

Genuine leather has a classic use in the many luxury kits of personal accessories and toiletries for men and women, as well as in covered metal cases for watches and jewelry. Striking use can be made of leather to accent a package.

Plastic foam. This stiff, lightweight material which made an immediate hit in merchandise displays, is now used in decorative and novelty packaging, for example, to set off gift tools. Its potentials do not limit it to the wintry treatments which marked its debut.

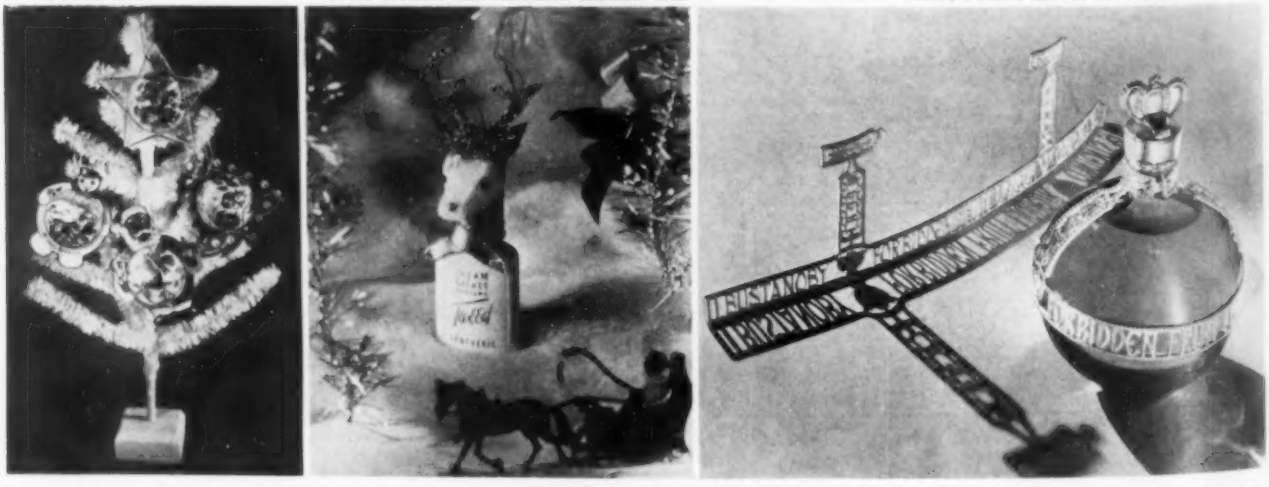
Ribbons and ties when used with care can transform a drab package. Available in woven and nonwoven types—of cloth, paper, plastic and their laminations—they are finished like velvet, satin, lace or cord in many widths, colors and designs.

Knotted off with fringe, pompons, tassels or bows, package fastenings need never be a useless "extra." For example, when glued by an overseal to the package wrap so that the paper must be torn before the product can be reached, a handsome ribbon or cord provides a feeling of expendable luxury.

Pre-cut and tied lengths of elasticized cord in metallic finishes are now being used by some stores to speed gift wrapping. Manufacturers who outer wrap their boxed products with gift papers may find this elastic cord an answer to the problem of a customer inspection. It is easily slipped off the package without damaging the outer wrap.

All kinds of prefabricated bows and other finishing ornaments are available which are easily attached to the knot of the tied package.

DESIGN, EMILY OPPA PHOTO COURTESY OLIN MATHIESON CHEMICAL CORP. LABEL, WYLIE & GREENE; PLASTIC, EASTMAN CHEMICAL



Vacuum-formed transparent acetate containers (left) formed in half spheres, with opaque printed acetate sheet cut in seasonal shapes sandwiched between, make gay hanky packs. White styrofoam reindeer head with sparkling antlers (center) tops perfume bottle with seasonal appeal. Injection-molded clear butyrate label becomes decorative element for liqueur bottle.

Novelty and gift packages

As the packaging industry grows in volume, variety and importance as a merchandising necessity, imaginative and attractive designs and constructions in packages become so much the order of the day that the borderline between the everyday and decorative package becomes less and less distinct.

Decorative packaging, basically, is directed toward gift and special-occasion markets. Sometimes decorative packaging is designed exclusively for gift giving, such as a Mother's Day package. In many other instances the decorative package is not slanted for gift sales exclusively, instead the emphasis is on beauty or some novel or seasonal theme, and buying for personal use as well as gift-giving is strongly motivated.

The novelty container, on the other hand, is not necessarily a decorative package, although it is almost invariably attractive. Most frequently it involves special construction in addition to unusual design. Sometimes the design is humorous or whimsical.

Decorative, gift, special-occasion, special-theme and novelty packaging as separate categories are all overlapping in their definitions and purposes. Yet each has its distinctive features, can perform a specific sales job.

Decorative packaging's excuse for being is the fact that its special appeals quickly identify and attract a buying audience—helping the Christmas shopper find just the right presents for the persons on her gift list; suggesting a watch for the graduate; selling "beauty" to the young lady at the cosmetic counter, or causing dad to buy a novel toy for the children on his way home.

The sales momentum enjoyed by decanter-packed liquor of the lower-priced, mass-market variety has been sustained well into 1956. The sales-inspiring venture of piling extra sales appeal into the package has proved to be extraordinarily successful. As a result, liquor store shelves bulge with an amazing selection of private-mold, distinctive bottles.

New techniques and materials are contributing to the liquor gift-package boom. An outstanding example is the cylindrical paperboard canister wrapped in vacuum-formed plastic sheet fabricated with a metallized gold finish and a basket-weave texture, with seal and brand name formed right into the wrap. Fancy papers are also entering the realm of the liquor package as an alternative to special decanters for the holiday seasons.

New materials and forms in general have had considerable impact in the field of novelty, gift and special occasion packaging. In one instance of dramatic presentation, utilizing a new packaging form, one watch maker demonstrates the waterproof qualities of his product by sealing the watch in a laminated water-filled envelope.

A candy manufacturer is taking advantage of a faster more economical method of producing contoured metal containers known in the trade as "bulge cans" which were formerly impractical to manufacture domestically because of the amount of hand labor employed in the spinning process by which they were made.

Another metal package widened the already established re-use values of metal gift packages by shaping the metal-box lid into an attractive tray.

Vacuum-formed plastic sheeting has introduced a flexible, low-cost medium to the novelty field. Bubble bath crystals, usually difficult and expensive to package with any degree of distinction, have gained sales impetus from the colorfully carded, formed shells and shapes. Baby shoes, silver spoons, cuff links and earrings have also been packaged in the vacuum-formed container.

The stock-in-trade folding carton continues to turn up in unusual, outstanding shapes. A box is a box until it becomes a geometric solid, a spice cabinet with swinging doors, a pirate's chest or a jack-in-the box.

Two handkerchiefs becomes a more attractive gift item when given a seasonal between-holidays fillip by being packaged in a Tom Collins glass with a swizzle stick and a slice of orange.

Today's shining examples in deco-

PHOTO COURTESY FREDERICK A. KRAUSE ASSOCIATES



PHOTO COURTESY EMILY T. OPPA

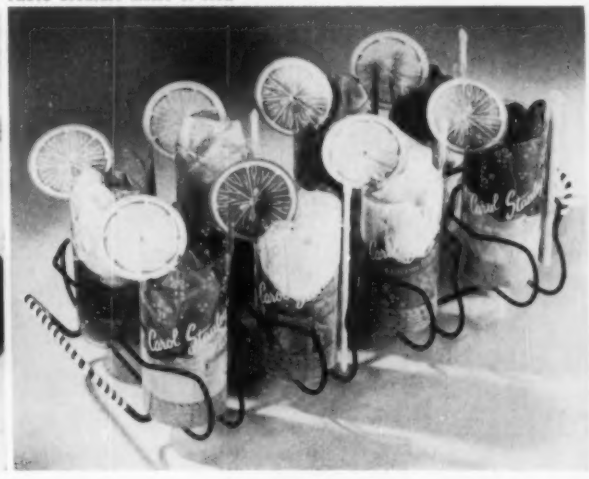
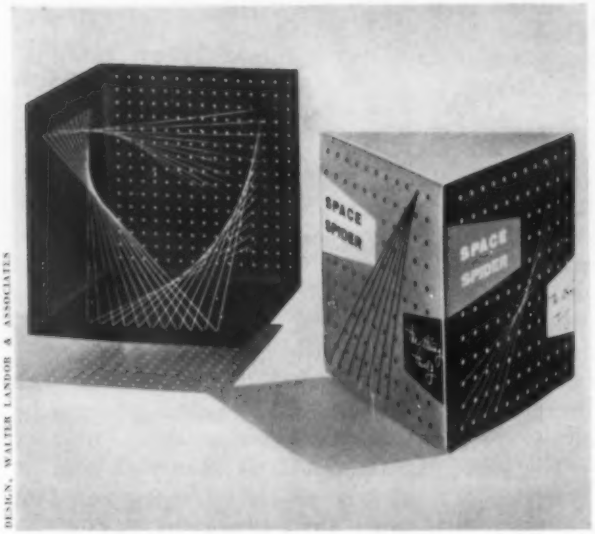


PHOTO KING PLASTIC PRODUCTS CORP.



Silk-screened fruit-cake gift tin (left) offers double re-use value. Lid is also a serving tray. Packaged in acetate glasses to look like Tom Collins, handkerchiefs (center) become attractive summer gifts. Vacuum-formed simulated metallic wrap for liquor decanter (right) adds the needed note of luxury to turn stock bottle into a gift.



DESIGN, WALTER LANDOR & ASSOCIATES

Novel triangular set-up box for new toy is designed to arouse instant curiosity.



New-type contour canister, adopted for chocolates, is similar to imported handmade "bulge cans." Container is lithographed in primitive colors and has a padded lid.

PHOTO COURTESY PIONEER CAN CO., INC.



PHOTO COURTESY HINDE & DAUCH

One-piece decorated fibreboard die-cut assembly made without staples, tape or glue is economical container for gift foods—fruits, preserves, nuts, etc.

rative packaging also embody the changes in retailing that have been going on for many years. The trend to self service, with its emphasis on the package as the prime sales agent, has placed an added premium on design that will speak for itself.

The handsome presentation box gleaming in gold foil, with its sparkling transparent lid that shows off the towel set inside and makes it the perfect hostess or shower gift is even brighter than its surface voltage might indicate. It is of folding construction, though having full set-up beauty and rigidity in an unusual shape. It is of remarkably tough material, which means that it will take a beating on the counter without losing its brilliant finish. It requires less storage space in the plant of the product manufacturer.

PHOTO COURTESY ACME PAPER BOX CO.



BOX, STERLING PLASTICS CO.

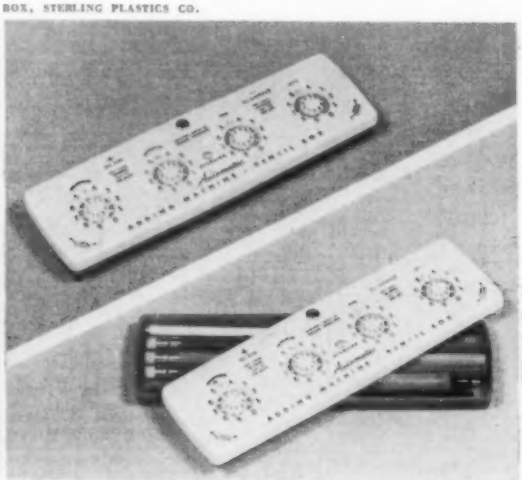


PHOTO COURTESY ARROW MFG. CO.



Spice chest package (left) makes kitchen staple an appropriate gift for many occasions. Turning the top of pencil box (center) into an adding machine gives it the sales advantage of novelty. Water-filled, transparent Pliofilm pouch (right) dramatizes major sales feature of waterproof watch.

Showmanship for Packages

Showmanship of a special kind is demanded for one class of packages that the public never sees—the samples that ethical drug firms send to the country's 170,000 physicians.

The only way these drugs can be sold is through a doctor's prescription. And one of the best ways to get him to prescribe them is to offer samples that will arouse his interest and lead him to evaluate their effectiveness with his patients.

Because a clever package helps a particular sample to stand out from the crowd, no money is spared by drug firms in the preparation of smart copy appeals, special art work, quality paper stocks, color printing and unusual constructions to achieve the desired degree of attractiveness. The package can be dramatic—but it must also inspire confidence.

Sharp & Dohme, Philadelphia, has distributed a group of sample packages illustrating this new trend, which is reaching immense proportions in the drug and pharmaceutical field today.

Three of the Sharp & Dohme packages are constructed like stiff-covered miniature books with amusing titles, illustrations and color treatments that immediately arouse interest. Two deal with products suggested for patients who must watch their weight and the third contains a sample of a product recommended for hypersensitive patients. Inside the book folders, die-cut frames hold the regular catch-book type of unit-packed samples which, alone, would have no drama. A folder humorously suggests the use of the sample product.

A group of unusual-shaped boxes has been designed for several other samples, as dramatic presentations for the standard type of professional samples they enclose. Two of these, made with sloping sides, have folding construction for bases and rigid construction for the hinged covers.

An interesting square folding box, printed in gray and coral, carries an illustration of an overweight girl sitting in a hanging scale. It shows how even a very personal subject, such as overweight, can be handled with lightness if the art work is delicately handled and designed to be pleasantly tactful.

A very ingenious triangular-shaped folding box is used as a mailer for B.F.I., an antiseptic first-aid dressing and surgical powder. Wash-drawing color illustrations, suggesting uses, have more the feeling of quality magazine spots than the usual advertising art work. The one-piece carton has an unusual flap construction and on the base of the triangular carton is a place for the mailing label.

Apparently, it is good practice to change the sample package for the same product occasionally. A can of the B.F.I. powder has also been sent to doctors in an attractively printed sleeve illustrating uses and enclosed in a polyethylene bag, tape tied with a card on which may appear salesman's name or other message.

A polyethylene bag also makes an attractive enclosure for a sample of unit-packed "Stolic Forte" tablets for high blood pressure. The standard sampler is dramatized by a color-printed folder with a humorous illustration. The picture shows through the polyethylene bag. There is no copy. The package must be opened to find out what it contains.

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Advertisers' index by subject matter

for SECTION 17—Shipping containers

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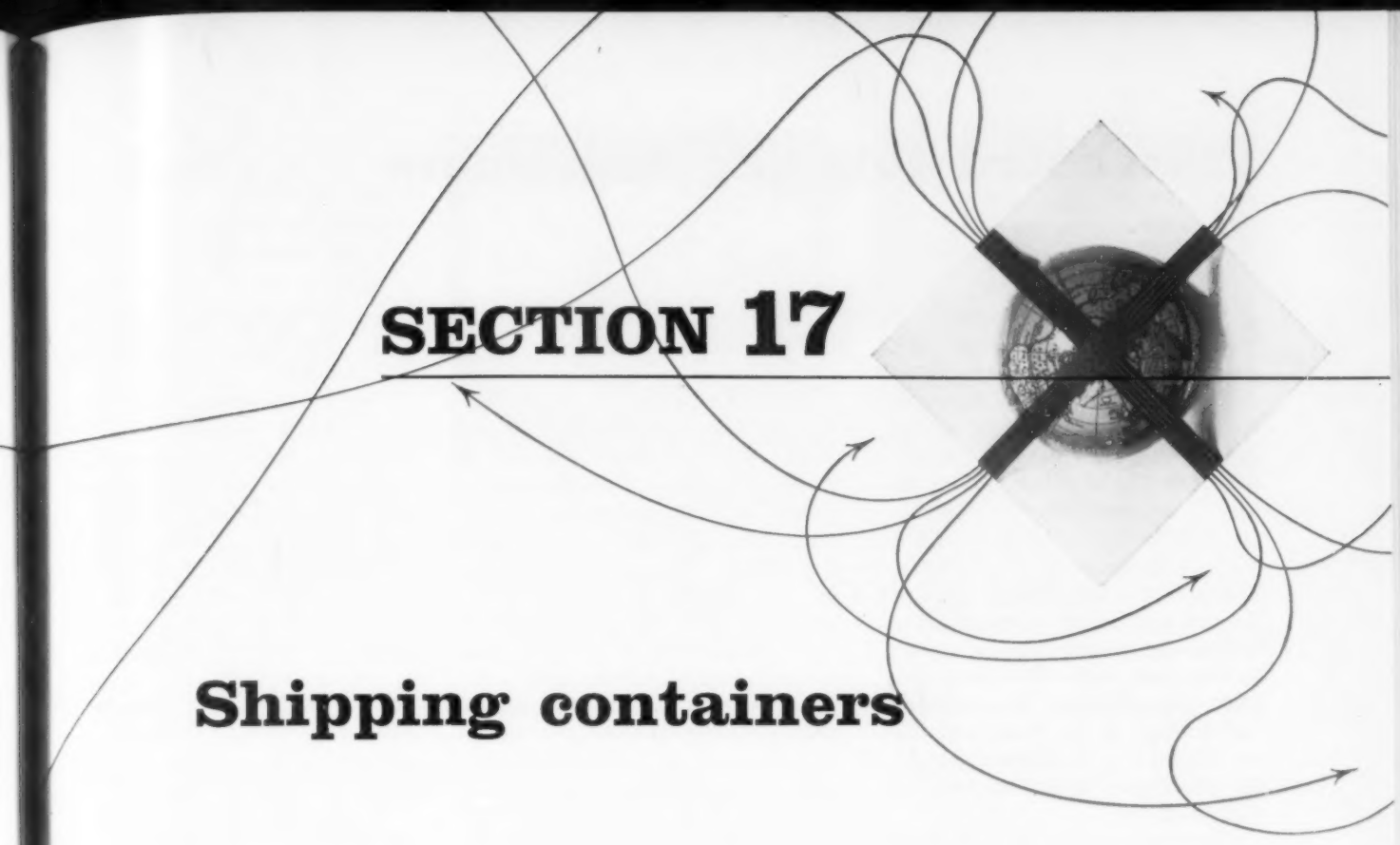
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Fibreboard shipping containers

by W. B. LINCOLN, JR.*

Corrugated and solid fibreboard products are of wide interest to packagers and shippers for many reasons. Containers made of these materials are used in greater number than any other rigid-type shipping container. The fibre-box industry has been characteristically successful in adapting its product to new and difficult applications—with worthwhile savings to the user. These lower costs are not confined to materials alone, but are also found in the superior job of protection, economy of packaging labor, reduced freight costs and other contributing factors. Thus it is wise for shippers to evaluate thoroughly the possibility of using fibre boxes for their products.

Fibreboard is extremely adaptable in meeting strength requirements. Designers find it is possible to shape and use it in an endless variety of ways. Many of the newly adopted fibreboard packs are far superior to older and seemingly stronger types of construction. Such packs are successful because they are engineered to protect the contents with strength built into the pack where it is needed.

Corrugated fibreboard has found a substantial place in the construction of pallets, bulk pallet packs and unitized loads, as well as containers for major appliances such as refrigerators, stoves and other large and heavy items. The use of fibreboard in packing vitreous china plumbing fixtures and other articles long considered beyond its capacity is now commonplace.

A recent test on an appliance pack made of corrugated fibre showed complete freedom from damage to the appliance for the first time on record. Older types of packs had always permitted some damage to the product when subjected to the same test hazards. This experience has been repeated many times in the past. Such improved performance accounts for much of the seemingly endless vitality and growth of the fibre-box industry.

There are two broad types of construction: corrugated fibre and solid fibre. Both types are fabricated by combining a number of sheets of paperboard having special structural characteristics designed to give the container rigidity and form. Various grades (strengths) of the paperboard are available.

Despite the apparent simplicity of the fibre box, a proper understanding of its uses requires application of all the basic rules governing sound packing, plus a knowledge of the special characteristics the material offers.

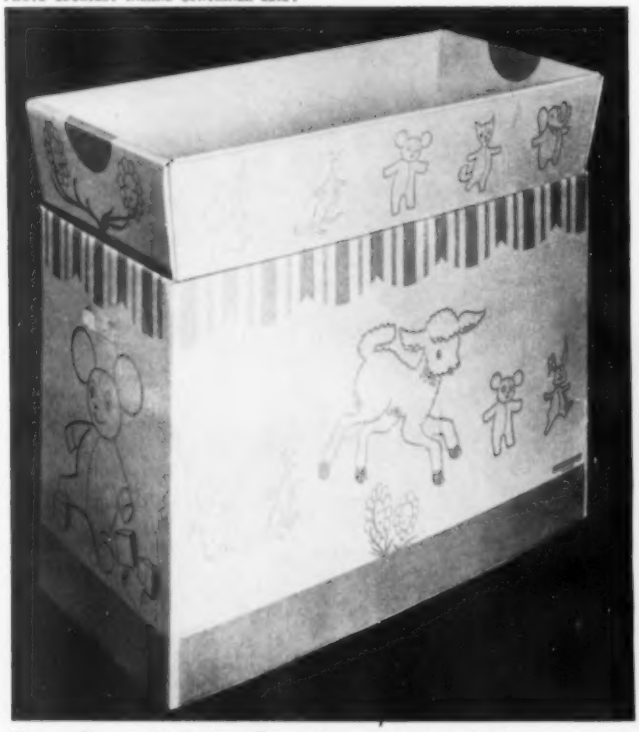
Corrugated board is made with the fluted or corrugated sheet, usually of 0.009-in. thickness, attached to the facings or liners by adhesives. There are three common forms in general use: (1) single face, (2) double face and (3) double wall. Three flute sizes widely used in the industry are designated A, B and C. (See table, p. 633.)

The fundamentals of fibreboard-box specifications revolve around the following: (1) carrier regulations and standards (see "Shipping Regulations," p. 677) and (2) standard practice and nomenclature in the fibre-box industry; in the individual plant and in the box-user's organizations.

Every corrugated-fibreboard box must comply with carrier regulations. Of these, Official (railroad) Freight Classification Rule 41 is the most im-

* Assistant Vice President, Technical Service, Inland Container Corp., Indianapolis, Ind.

PHOTO COURTESY INLAND CONTAINER CORP.



Versatility and design flexibility of fibreboard are illustrated by this corrugated-fibre bassinet.

PHOTO COURTESY CENTRAL FIBRE PRODUCTS CO., INC.



Individual turkey container features easy opening and relocking flaps so housewife can inspect the contents.

portant. However, adherence to all carrier rules does not guarantee safe delivery. In the solution of every packing problem, analysis will disclose that certain principles must be observed to obtain adequate protection of the product being shipped.

Fibre-box-industry standards dealing with terminology, correct style names and proper order of dimension have all been in general use for many years and should be adhered to as closely as possible. It is well to verify all such points with your boxmaker as there are certain phases not yet standardized where ample opportunity remains for misunderstanding.

To fill a standard order properly, the boxmaker needs certain data that can be outlined as follows:

Style. In many instances one of the widely accepted standard styles will be called for, but where requirements are special, tailor-made designs can be evolved. The container illustrations accompanying this article are chosen from the Fibre Box Association's 1955 awards exhibit and show how versatile the style adaptations can be.

Size. Length, width and depth (always in that order).

Type of manufacturer's joint (if restricted).

Grade as defined by: (a) Mullen test or (b) weight and type of liners and corrugating material.

Class of board. Single wall, double wall, etc.

Type of flute (if requirement is special).

Other information that is needed includes (1) color of inks, (2) copy and art work, (3) size of type, (4) location of all printing in detail (special stamps and caution marks or other requirements of the carriers where these are necessary) and (5) a box number to identify boxes and specification sheets and to facilitate ordering, inventory and the like.

Special requirements

If requirements are special, additional data may be needed such as:

1. Overprint color, waxing or other surface coatings.

2. Inner packing details. These often require a complete knowledge of the product or samples of the actual product to permit developing a sample pack. In certain highly standardized types of construction—those where partitions, liners and pads are used in the packing of glass containers—the simple designation of cell size and arrangement, with type of pack desired, will often suffice.

3. Tolerances on basic dimensions of the item to be packed if a factor.

4. Methods of case loading and sealing to be used.

PHOTO COURTESY GAYLORD CONTAINER CORP.



Premium potatoes ordinarily poor shippers are well protected by corrugated box replacing burlap sack.

PHOTO COURTESY KIECKHEFER CONTAINER CO.



Retailers get a quick-turnover pack; the consumer a family-size unit in this telescope, half-slotted container.

Basic information

In all cases, the following factors affect box specifications and are an aid to the boxmaker if known:

1. Nature of product: (a) weight, (b) size, (c) consistency, (d) susceptibility to contamination, (e) value, (f) raw material or finished product, (g) strength, (h) design, (i) finish, (j) components set up or knocked down, (k) unusual hazards involved in handling, (l) bill-of-lading designation of contents, (m) gross weight of package.

2. Transportation to be utilized.

3. Trade customs.

4. Nature of manufacturing operations employed.

5. Distribution and storage conditions that will be generally encountered by the product.

If the product falls under the regulations of the Bureau of Explosives, complete specifications as to flash point, etc., are a must.

Some box users make the mistake of trying to spell out certain specifications in too great detail. Such detail often runs counter to the user's policy of trying to obtain the best and cheapest containers for his purpose. There is considerable minor variation within the ranks of the fibre-box industry on many details such as grades of liner or corrugating material, flute sizes and actual caliper measurement of a given size of flute. This admittedly presents a problem for both the buyer and the boxmaker. Even though in most cases the variations are minor, "molehills" are at times made into mountains by arbitrary and restrictive specifications which serve little purpose. If the problem is approached from the viewpoint of satisfactory end performance, however, it can be readily solved.

It is necessary to select boxmakers who know how to get the best out of available materials and the designs used. Let them see your problems and develop a thorough understanding of requirements. Use their salesmen and engineers as packaging con-

PHOTO COURTESY THE LAWRENCE PAPER CO.



Besides having eye-appeal, this half-bushel produce shipper saves shipping charges because of its light weight. It is easily stacked because of its flattened corner pieces.

PHOTO COURTESY STONE CONTAINER CORP.



New use for corrugated is this shipper for live birds which replaces wooden boxes or cages.

PHOTO COURTESY GRAND-CITY CONTAINER CORP.



Die-cut inner packing of box is adequate protection for TV part; printed exterior demonstrates use.

sultants, not just peddlers. Only then will your specifications and containers be adequate and effective and your packaging costs be at a minimum.

Determining size

How big is a box? Apparently this question poses a number-one problem to many users. It is not being facetious to say that boxes are of only two sizes: The right size and the wrong size. In the latter case, it becomes necessary to find out why, where and how great the size error may be. This is also a two-stage problem, involving establishment of the correct size and building a box to that size.

Establishment of the correct box size in the first place is more complex than many realize. It may require special study of user specifications, practices, handling methods and desires as to fit. Problems of personality, as well as manufacturing methods and situations, enter into the picture, in addition to such obvious problems as products which tend to settle or change size or shape during storage.

A case in point is furnished by two plants belonging to the same company and packing exactly the same cartoned product. It was found necessary to increase one dimension of a shipping case $\frac{3}{16}$ in. for use at one of the plants because the packages are handled more roughly and the product caused the side walls to swell.

Once the pattern of the size relationships has been established, the specifications writer should be able to do his part in keeping with that pattern and the competent boxmaker can produce boxes of accurate dimensions within normal tolerances.

Many box buyers are concerned about the problem of checking boxes to determine whether they are the correct size as ordered. This is a rather difficult thing to do if the problem is approached in the orthodox manner (trying to measure the box as a complete box). Fortunately there is a very practical way to check size accurately. The procedure is to load the box with the contents. If they fit properly, it is the correct size.

A more positive way of checking complete boxes against dimensional specifications is to make up a gauging block of ¾ in. plywood built accurately to the desired dimensions. This works well if there are not too many sizes.

If these methods are not suitable,

PHOTO COURTESY INDUSTRIAL CONTAINER CORP.

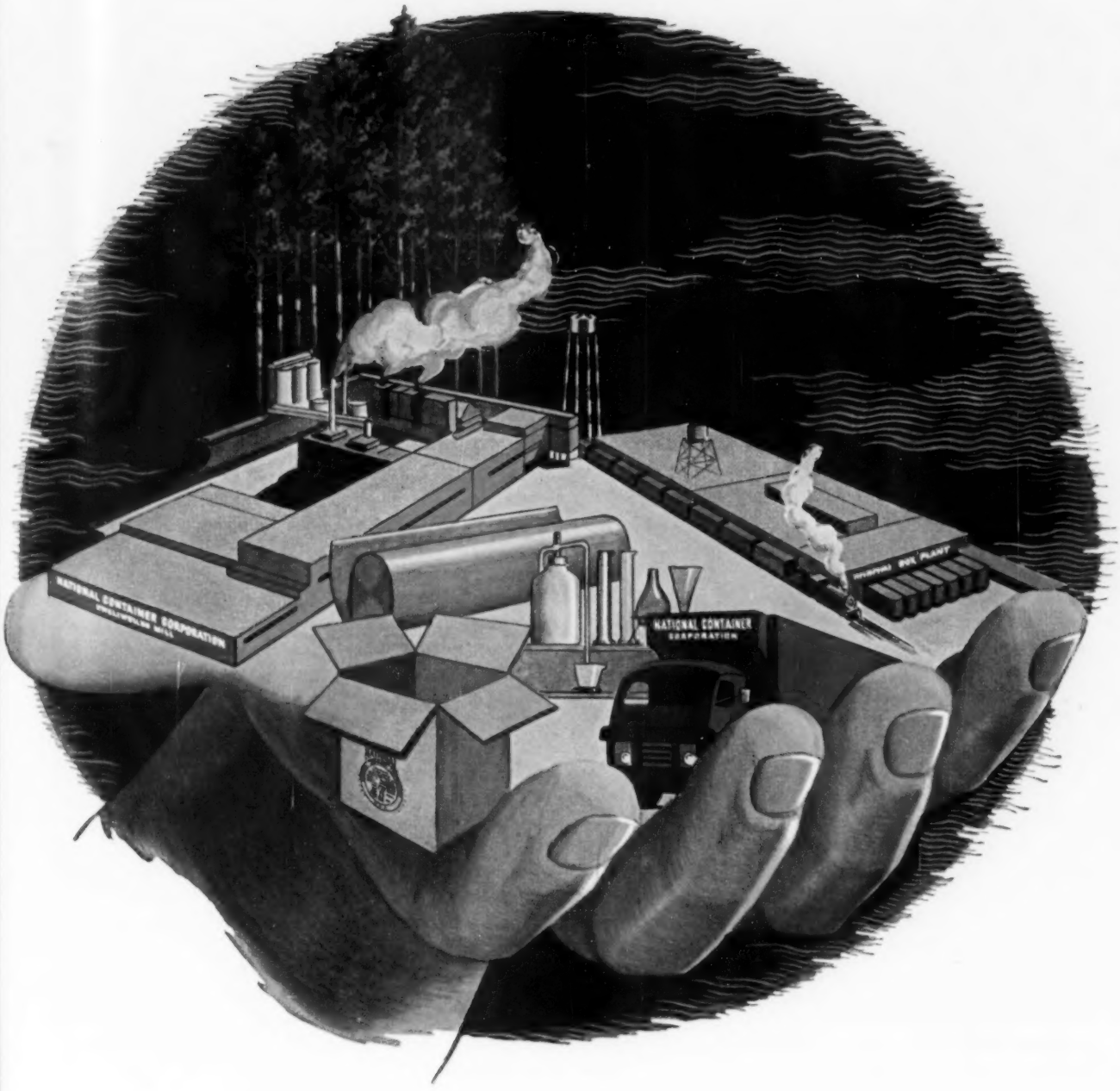


PHOTO COURTESY GAYLORD CONTAINER CORP.



Convenience and economy are major advantages of three-piece, full-telescope, light-weight nail box (far left) with tear-tape opening.

Die-cut fibre container performs triple service as carrying case, container and display for photographic equipment.



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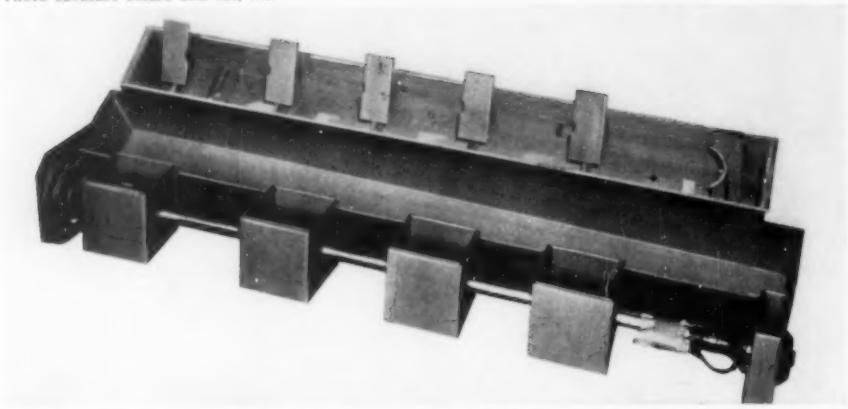
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PHOTO COURTESY ROBERT GAIR CO., INC.



Container cost was reduced 50 per cent, weight 42 lbs. and packing time 8 man-minutes, when this all-corrugated pack was adopted for sump pump.

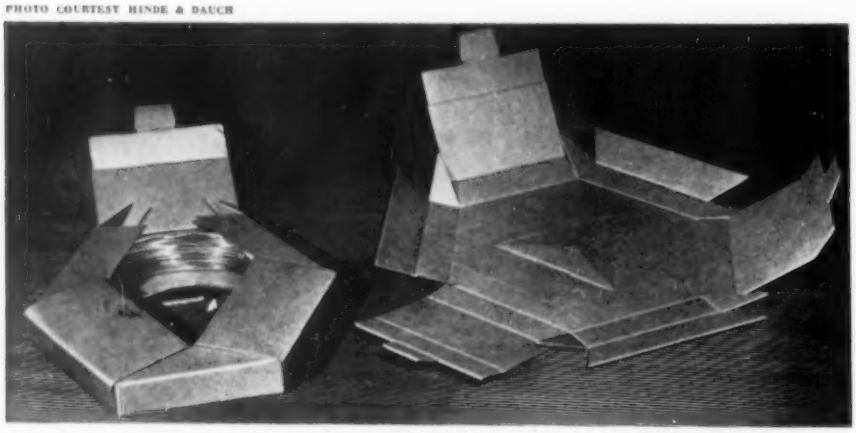
your boxmaker can demonstrate how to check dimensions by measuring between scores.

Performance checks

Inherent high strength combined with minimum weight, stiffness and rigidity without brittleness, and high tensile strength with built-in cushion for shock absorption are all combined in the unique characteristics of the fibre box. To take full advantage of these valuable characteristics, it is necessary to design containers and inner packing details properly. While to assure safe carriage, certain principles must be observed where applicable. These may be defined:

1. *Enclosure.* Surround product with a properly protective container.
2. *Compatibility.* Employ containers and inner packing materials suited to the needs of the product.
3. *Retention.* Provide strength values to prevent rupture and leakage.
4. *Restraint.* Prevent any damaging movement and control cushioning movement.
5. *Separation.* Prevent damaging contact between articles by use of dividers.
6. *Cushion.* Reduce shock with resilient packing.
7. *Clearance.* Leave some space between articles or articles and container walls, thereby preventing all contact.
8. *Support.* Brace the container and contents against the loads and pressures encountered in handling and storage.
9. *Position.* Arrange the contents to take advantage of strong areas and so reduce hazard at the weaker areas.
10. *Nonabrasion.* Avoid rubbing or wear at points of contact through proper selection of materials.
11. *Distribution.* Avoid concentration of pressure by spreading contact over a considerable area.
12. *Suspension.* Attach article to container on one or two faces only, leaving others free.
13. *Exposure.* Provide openings for inspection and observation or ventilation of contents.
14. *Closure.* Complete closure and secure the container against accidental opening.

PHOTO COURTESY HINDE & DAUCH



Sharp decrease in damage claims and packing time was chalked up to the adoption of this hexagonal, flat fibre box for shipping malleable wire.

15. *Instructions.* Label the packed container with proper information covering nature of contents, destination, handling methods and other pertinent data.

The requirements for containers in various types of service may be broadly classified by (1) type of load and (2) type of traffic conditions or hazard level to be encountered.

It is important to remember that *regardless of the type of load, the same performance values are required in all containers* to satisfy the objective of safe delivery, that is, the loaded container must be able to withstand equal rough handling, stacking loads, etc., when the handling is to be the same. To achieve equal performance values, however, involves radically different container construction and strength of materials. This is unavoidable if boxes are to resist the greatly increased stresses and hazards imposed by the more difficult types of load as compared with easy loads, and give the increased protection required by easily damaged articles.

Shipments which will be handled by different distribution methods require vastly different performance standards. Quite different grades, designs or amounts of container and inner packing materials are specified for adequate strength to cope with the different hazard levels. These hazard levels may be classified according to the following:

1. Local domestic (city) delivery.
2. General domestic shipping (nation-wide delivery): (a) less than carload lots; (b) carload lots.
3. Peacetime export shipping.
4. Wartime or military overseas shipping.

The certification of containers by the manufacturer, as provided for in Rule 41, is a statement that the container has been manufactured in accordance with Classification provisions. *It has no further significance.* This point is often misunderstood by box users. The boxmaker's certification does not mean the box is necessarily adequate for the packing of all products within the weight and dimension limits specified. The selection and design of adequate containers is an engineering problem that must be solved according to individual needs.

The modern fibre box properly used can be of real assistance to the merchandising program. Boxes may be attractively printed or decorated with an overprint design, advertising to the

PHOTO COURTESY CONTAINER CORP. OF AMERICA



Corrugated box for household water system weighs about 25 lbs. less than former pack and permits printing model and horsepower data in full view.

world at large the product, the manufacturer's name and any other desired message.

Fibre containers may be designed to permit transformation into attractive, effective and economical displays. The container can be an actual selling tool to compel the salesman to demonstrate his product effectively.

Testing fibreboard containers

Fibre boxes are, in general, tested by the same methods used to evaluate containers of other types. Tests for box values include:

1. Compression resistance to stacking loads or thrust in cars, etc.
2. Rough handling: (a) revolving drum, (b) drop, (c) conbur incline impact and (d) vibration.

Tests applicable specifically to fibre container board and materials include (1) Flat crush test (of corrugated flutes); (2) Bursting strength (Mullen or Cady); (3) G. E. (Beach) puncture and stiffness; (4) Elmendorf tear test; (5) Weight per 1,000 sq. ft. and (6) Caliper or thickness.

Careful visual examination of containers will also disclose many features of construction affecting their serviceability and may indicate relative merits when more comprehensive tests cannot be made.

While these procedures are superficially simple and easy to comprehend, all important testing should be conducted under carefully controlled standard conditions by competent engineers, as proper interpretation requires experience.

For the purpose of predetermining the adequacy of the *packed product* prior to shipment, increasing use is being made of preshipment test cycles as established by the National Safe Transit Committee. In these cycles, packed products are subjected to standardized programs of vibrations and severe impacts duplicating anticipated rough treatment in handling and shipping. If the product remains undamaged, the entire assembly is certified as suitable for shipment with reasonable assurance for minimum losses from damage in transit. It should be noted that this is a test of the complete pack, and the ability of the product itself to withstand rough handling is measured as well as the protection afforded by the container.

APPROXIMATE FLUTE CHARACTERISTICS OF CORRUGATED BOARD[1]

Type	*Number of flutes per ft.*	*Height of flute, in.*	*Thickness of 200-lb. test combined board, in.*
A-flute	35-37	0.185	3/16-7/32
B-flute	50-52	0.105	1/8
C-flute	41-42	0.145	5/32

[1] These dimensions are subject to considerable variation among different manufacturers, and combined board caliper will vary with the thickness of the liners used.

The production and supply of fibreboard boxes is definitely a service to industry. In buying boxes, you are really buying shipping insurance for your product. Irrespective of your specifications, that is the real commodity the fibreboard-box industry produces and the safe delivery of packed products is the ultimate proof of the suitability and quality of the material and the container used.

Recent developments

Fibre boxes and packing materials have demonstrated a surprising ability to perform satisfactorily in many new fields. Size and weight of contents have greatly exceeded all limits of just a few years ago. Especially has this been true in the successful packing of household appliances. Small machinery as well as heavy, high-density products such as bolts, nuts and nails are now extensively packed in corrugated. Increasing use is being made of bulk packs and palletized packs constructed of corrugated fibreboard. Expanded use of corrugated fibre boxes for the shipment of citrus fruits as well as other fruits and vegetables is occurring. A revolutionary new method of pre-cooling lettuce has permitted the successful use of corrugated fibreboard boxes in the shipment of that product. The popularity of opening tapes is growing rapidly. The tear strip saves time and effort; eliminates the hazard of injury to personnel or damage to products when knives or other devices are used. Different types of tear tapes and a range of applications are available.[2]

The fibre-box industry continues to expand to meet the demand for its product. More and more board mills are being built to supply the growing markets.

[2] See "Swing to Tear-Strip Cases," MODERN PACKAGING, June, 1954, p. 116.

PHOTO COURTESY CORNELL PAPERBOARD PRODUCTS CO.



Fibreboard pack with liner and tray for fragile sink reduced packing and shipping costs and made sink easier to pack and handle.

Steel shipping containers

by LIVINGSTON KEPLINGER*

Steel shipping containers, of which approximately 100-million new units are produced for sale annually by the industry's 80-odd plants, carry the products of the petroleum, chemical, paint and varnish, food and other industries. They are also used in quantity by the armed services.

Steel shipping containers are divided into two basic groups—drums and pails—and are of various types, such as regulatory or non-regulatory, single-trip or re-usable, heavy or light, tight or full open-head, and lined or unlined.

The industry defines a *drum* as any single-walled cylindrical or bilged container, 13 to 110 gal. in capacity, made of steel sheet in all gauges.

A *pail* is defined as any shipping container with or without bail and handle, having a capacity of 1 to 12 gal., inclusive, constructed of steel sheet 28 gauge or heavier.

In specifying the thickness of steel used in containers, manufacturers use U. S. standard gauges. This is a numbering system which corresponds to specific thicknesses, with higher numbers denoting thinner sections. The accompanying table of more commonly used gauges provides measurements in decimals of an inch.

All steel shipping containers are made in accord with the specification requirements of either the Federal Government's Interstate Commerce Commission, if they are to carry "regulatory" (dangerous) products, or the Consolidated Freight Classification Committee's Rule 40, if they are to carry "non-regulatory" products (products not classified as dangerous).

ICC specifications, based upon the best information available and usually substantiated by tests, provide for the safe transportation of explosives and other dangerous (regulatory) products. They are revised from time to time and are kept in workable order by the Bureau of Explosives, which is a part of the Association of American Railroads.

Shipping regulations and specifications covering authorized shipping containers for all regulatory products are contained in Tariff No. 9, Interstate Commerce Commission Regulations, issued by the Bureau of Explosives, New York.

Gauge number	*Thickness, inches*	*Gauge number*	*Thickness, inches*
12	0.1094	19	0.0437
13	0.0937	20	0.0375
14	0.0781	22	0.0312
15	0.0703	24	0.0250
16	0.0625	26	0.0187
17	0.0562	28	0.0156
18	0.0500		

Each ICC regulation specifies the type of container in which a product must be shipped and containers are identified and referred to by the number of the specification under which their manufacture is authorized, such as ICC-5 or ICC-17E containers.

In general, corrosive products, such as acids, require an ICC-5A container. Flammables with a flash point below 20 deg. F. require an ICC-5 container and flammables with a flash point from 20 to 80 deg. F. require an ICC-5B container. All these specifications cover the *returnable* (re-usable) or "heavy" (18 gauge or heavier) steel shipping container.

Other specifications, such as ICC-17E, cover "light" steel shipping containes (19-gauge or lighter steel) and *non-returnable* (single-trip) containers. The latter cannot be used again as shipping containers for the original regulatory, dangerous product once the contents have been removed following initial shipment—unless the drums are re-tested and re-use approval is obtained from the Bureau of Explosives.

For protection of the manufacturer and user and for proper identification by the carrier, container manufacturers must identify containers as to the regulation under which they were manufactured. *Single-trip containers* must have their bottoms embossed "STC." Container bottoms must also bear manufacturer's name, identifying symbol or trademark (which is registered with the Consolidated Classification Committee); the U. S. standard gauge of metal in its thinnest part; capacity of container and year of manufacture. These may be abbreviated and must appear in the order specified. For example, 18-55-55 signifies that the container is made of 18-gauge steel, is of 55-gal. capacity and was made in 1955.

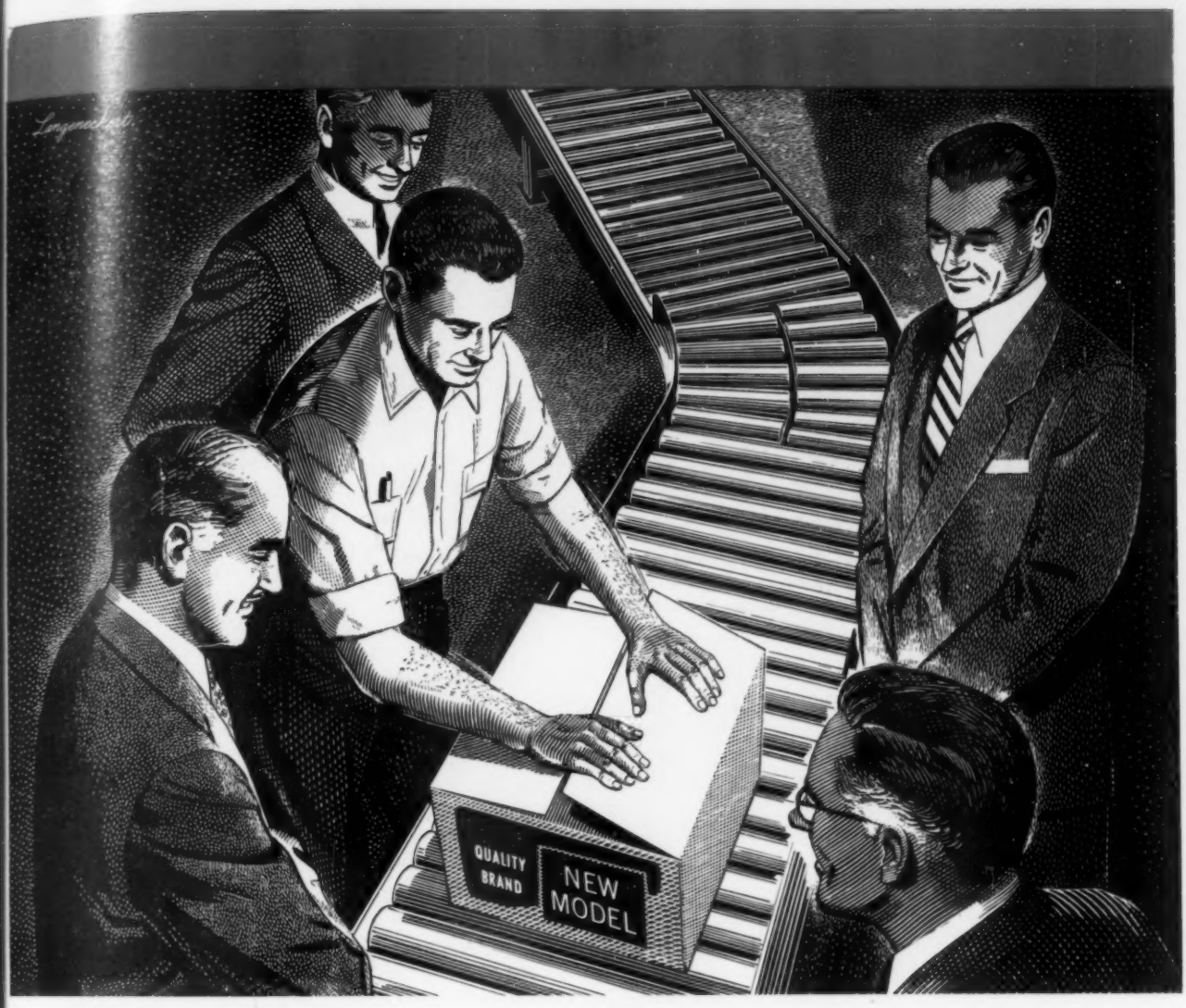
In general, liquid products are shipped in tight-head containers, which are ordinarily provided with threaded or screw-type openings. This is always true for highly flammable products like gasoline and almost invariably for less flammable products, such as antifreeze alcohol, kerosene and lubricating oils. Solids and semi-solids are shipped in open-top or removable-head containers.

Tight-head containers are equipped



These steel shipping containers are as smartly dressed as any industrial packages you will find. Their design identifies them as a member of a large and well-known product family.

* President, Steel Shipping Container Institute, Inc., New York.



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PHOTO COURTESY JONES & LAUGHLIN STEEL CORP.

Closed-top polyethylene liner is integral part of container designed for soft-drink concentrates, chemicals, etc.



This drum is printed in over-all lemon color and black. In effect, it is a traveling billboard of unusual interest.

with two standard openings, one 2-in. diameter, the other ¾-in. diameter. Certain drums, used primarily in the chemical industry, also have a 2-in.-diameter side opening.

When designed for shipping semi-solid products, 55-gal. or 100-lb. grease drums may be fitted with a bolted cover in the center of the head. These are nominally 15-in. diameter for 55-gal. drums and 9-in. diameter for 100-lb. grease drums. Four to eight bolts are used to secure the cover.

"Lug covers" are widely used on 100-lb. grease drums and smaller containers. These are 9-in. diameter and have a number of lugs or ears which snap closed over the opening in the head of the drum. They are not used on 55-gal. drums, but full lug covers are common on 5-gal. pails.

Removable-head containers are fitted with either "lever-type" or "bolted" rings to secure the head to the body of the drum. The rings are completely detachable and have an open section, the ends of which are connected by a threaded bolt or lever arms. In the lever type a lever attached to the ring is used to close the ring, thus clamping the head to the drum body. With bolted rings, tightening the bolt closes the ring.

The 55-, 30-, 15- and 5-gal. containers and the 100-lb. grease drum account for not less than 95% of all steel shipping containers produced. Some of the distinguishing features of the more popular types of containers and the products they carry follow:

The 55-gal. ICC-5 drum is made of 14-gauge steel, equipped with 1-by-1½-in. I-bar rolling hoops and provided with a specially threaded flange and plug. This drum is used for the shipment of acids, most commonly sulphuric acid, and weighs about 112 lbs.

The 55-gal. ICC-5 drum may be made of 14-gauge steel with corrugated or expanded rolling hoops, or of 16-gauge steel, in which case it is equipped with ¾-by-1¼-in. I-bar rolling hoops. Each of these drums weighs about 90 lbs. Another drum made and used as an ICC-5 shipping container is the 55-gal., 14-gauge drum equipped with ¾-by-1¼-in. I-bar rolling hoops and weighing about 107 lbs. These three ICC-5 drums are all used for the shipment of flammable liquids, the flash point of which is below 20 deg. F., for example, gasoline.

The 55-gal. ICC-5B drum is made of 16-gauge steel with the rolling hoops expanded or rolled into the shell. This drum weighs about 74 lbs. and is used for the shipment of flammable liquids, the flash point of which is between 20 and 80 deg. F., such as alcohol and lacquer thinners.

All these ICC drums are returnable and have chimes reinforced by means of a separate chime ring rolled on the container.

The non-returnable, 55-gal. ICC-17E drum is authorized for the shipment of flammable liquids such as antifreeze alcohol, the flash point of which is 20 to 80 deg. F. The 55-gal. Rule 40 drum is authorized for the shipment of non-regulatory products, such as lubricating oils, salad oils and paints. Both these drums are made of 18-gauge steel, have rolling hoops expanded into the shell and non-reinforced chimes. The Rule 40 drum is also made in full open-head style for the shipment of solid or semi-solid products. The average weight of these drums is about 50 lbs.

The 100-lb. 20-gauge grease drum is also a Rule 40 container, with rolling hoops expanded or rolled into the shell and weighing about 16 lbs.

The two most popular 5-gal. pails are made of 24- and 26-gauge steel. They may be designed plain or with one or two beads expanded into the shell. Some of these pails are made for the shipment of regulatory prod-

STEEL SHIPPING PAILS AND PACKAGES
(Standard Types)

Type	*Capacity range, gal.*	*Gauge*
Lug-cover pails	1-12	
Ring-closure pails	1-12	
ICC-5	1-12	22-14
ICC-5B	1-12	24-16
ICC-5C	5-12	20
ICC-17C	1-12	22-18
ICC-17E	1-12	24-19
ICC-17H[1]	5-12	24-18
ICC-37 series	1-12	28-20
Ink pails		
Putty pails		

[1] Covers, 20-14 gauge.

LIGHT SHIPPING DRUMS
(Standard Types)

Type	*Capacity range, gal.*	*Gauge*
Rule 40	13-73	29-16
Grease[1]	14-58	24-16
Grease	100 & 120 lbs.	24-19
Open top[2]	13-72	26-16
Agitator type	30 and 55	19-16
ICC-17C[3]	13-55	18-16
ICC-17E[4]	13-55	20-18
ICC-17F	55	16
ICC-17H[5]	30 and 55	18
ICC-17X	30 and 55	19-18
ICC-37 series[3]	13-55	26-18

[1] Bolted or crimp covers
[2] Bolted or lever-lock covers
[3] Tight or full-removable heads
[4] Tight heads only
[5] Full-removable heads only



Paint container gets fresh coat of "sell"

See what happens when you call in a Gair specialist! A "lost-in-the-crowd" shipping container — in this case, Sampson Paint and Color Company's — was redecorated from top to bottom. Now it advertises itself in the store and on the job, too.

Bright red and black colors make the Sampson name stand out. What's more, an overall white weave pattern shares credit for the distinctive, new look.

Gair's graphic design is one reason for the container's smart new sales appeal — Gair's top-notch printing is another. As usual, this combination produces a container that catches everyone's eye.

Maybe it's time you took another look at your shipping container. If it isn't doing all it should to talk up your product, call your nearest Gair container plant. There'll be a specialist on the job fast.

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ucts under ICC specifications (for example, ICC-37D and ICC-17E single-trip containers). Others are made under Rule 40 for the shipment of non-regulatory products. Depending upon their steel gauge, these 5-gal. pails weight approximately 4¼ or 5½ lb. each.

Interior treatments

The rapid development of organic coatings by the industry has resulted in a widespread use of lined containers. Where only a negligible amount of containers were "lacquer lined" six years ago, 25% of all steel shipping containers now have linings of one type or another. Properly applied, linings make it possible to ship almost any product safely and economically in steel containers.

Much of the progress made in developing new or improved coatings and linings is due to the research program conducted by the industry at Battelle Memorial Institute. These efforts have shown that phenolics, vinyls, epoxys, polyamides, polysulfides and various blends can provide effective linings for many different products. Currently, phenolics predominate as lining materials.

Container producers are expending large amounts of money for equipment to apply coating materials which have been proved in service. Specific recommendations for linings most suitable for the shipment of products requiring this protection are available from them.

Sprayed and roller-coated linings are most prevalent, although limited use is currently being made of separate liners such as polyethylene bags.

Exterior treatments

While the rust-inhibiting process of phosphatizing is not new, its application to the steel-shipping-container industry is of recent date. It is generally felt that best results are obtained by phosphatizing when this is done on scale-free steel. The process or treatment as applied to steel containers results in conversion of the treated steel at the surface to a zinc-iron water-insoluble phosphatized coating.

The rust-preventive qualities of phosphate coatings inhibit to a high degree the spreading or creeping of rust from any scratch or abrasion to areas under undisturbed paint, thus restricting surface injury to the area actually damaged. Having a degree of porosity, phospate coatings provide an excellent bond for paint, lacquer and other such finishes. Phosphatizing is required at present for all drums sent to the armed services.

Steel shipping containers were early recognized as a good advertising medium. Today all principal container styles are available in attractive designs and colors, painted, silk screened and lithographed.

Although larger containers have been finished by painting or silk screening for some time, lithographing 55-gal. drums is a comparatively recent development. These three basic finishing processes allow the user of steel containers unlimited possibilities for brand-name identification or point-of-use sales messages. Painting can be combined with the use of stencils, decals or labels for the most economical finishes. The cost of silk screening and lithographing depends largely on the number of colors used, complexity of design, etc.



PHOTO, VULCAN STAMPING & MFG. CO.

Sturdy, standard ICC-17E 1-gal. tight-head drum with necked-in top is available in various interior finishes.

Industry progress

In 1902 the "Bayonne" steel barrel was introduced to the oil industry by the Standard Oil Co. Previously, the heavy steel barrels used in this country were of foreign manufacture and were of crude and heavy construction. The straight-sided steel drum made its appearance in 1907. It was manufactured of 16-gauge steel plate with soldered side seams and, in many instances, with soldered chime seams. Later the 18-gauge straight-sided drum with reinforced chimes and pressed-out, or I-bar, roll hoops was introduced. Eventually a wide range of gauges as well as different types of steel packages and pails became popular. The so-called 5-gal. pail, incidentally, was developed in 1914.

Today the manufacture of steel shipping containers is both a large and highly mechanized industry, which ranks second only to the automotive industry in the national consumption of sheet steel. In the modern plant steel drums are produced on high-speed automatic equipment at rates from 500 to 600 units per hour; smaller units are produced on machines operating at rates of 2,000 to 2,400 units per hour.

HEAVY SHIPPING DRUMS
(Standard Types)

Type	*Capacity range, gal.*	*Gauge*
ICC-5[1]	13-110	18-13
ICC-5A	13-110	16-12
ICC-5B[1]	13-110	18-13
ICC-6A[1]	13-55	14-12
ICC-6B[1]	13-55	16-12
ICC-6C[1]	13-55	18-14
ICC-6J[1]	13-55	19-15

[1] Available in either tight-head or full-removable-head styles.

Among the recent new developments are the following:

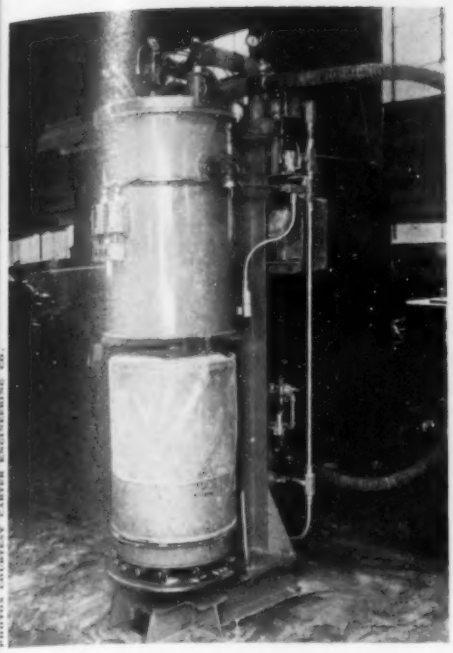
Recommended standard specifications for several types of steel containers have been developed jointly with the Petroleum Packaging Committee, and the first single Federal Specification for 55-gal. drums for the shipment of noncorrosive materials has been issued. Also under study with the Manufacturing Chemists' Assn. and the Institute of Shortening and Edible Oils are specifications for containers used by these two industries.

Filling is being speeded up with the use of subsurface filling equipment. In this method, the filling nozzle goes to the bottom of the drum and starts filling automatically. As the liquid level rises, the nozzle does also, but it remains just under the surface. This prevents foaming or air entrapment, thus speeding up filling and permitting greater capacity.

Reductions in handling are being made by the increased use of pallet loads and fork trucks.

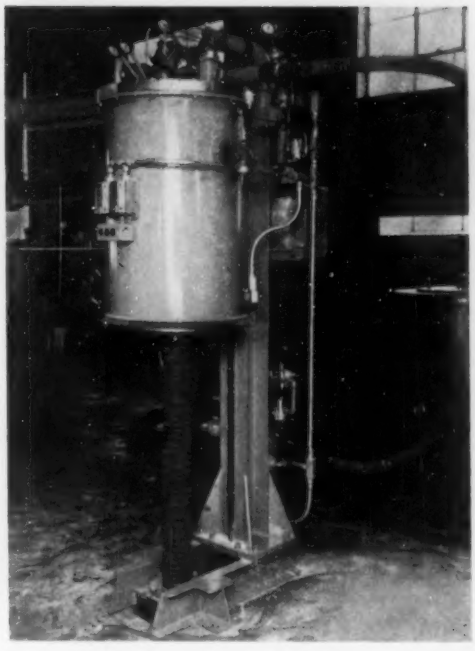
Commercially available coatings are being evaluated at Battelle Memorial Institute along with a study of the best procedures for applying them.[1] Work on new coatings has already resulted in the development of Synthetasine, an epoxy resin, designed for the protection of hard-to-package materials.

[1] See "Steel-Container Treatments," MODERN PACKAGING, Nov., 1954, p. 167, and Dec., 1954, p. 145.



PHOTOS COURTESY CURTIS ENGINEERING CO.

Drum, encased in shroud, is raised into a position which seals top and bottom of drum against rubber so vacuum can be pulled inside and outside the drum to keep it from collapsing during filling.



Built to fill the largest drum size, this machine also can fill smaller diameters and shorter drums when placed on spacer or carrier. Thus machine can handle varying sizes of nested drums one after the other.

Fibre drums

by GLENN MATHER*

Fibre drums are straight-sided cylindrical containers used either for domestic or export shipping. Although their principal use was originally for dry bulk powders requiring a siftproof container, many other classes of products are now being packed in fibre drums. Fibre drums have great strength, are light in tare, easy to open and close.

Fibre drums are made in capacities ranging from ¾ gal. up to 75 gal. or from 173 cu. in. up to 10 cu. ft. The reference to capacity in terms of gallons is consistent with general practices in the wood-cooperage and metal-drum industries. However, fibre drums have been used primarily for dry bulk products measured in pounds rather than gallons.

Diameters usually range from 8 in. up to 23 in. and the depth ranges from about 3 in. up to 42 in. or more. Weight limits range up to 400 lb., and higher weights are authorized for certain products and shipments.

There are several types of closures in use: (1) the friction-type or telescopic slip-on covers secured by gummed or pressure-sensitive tape, (2) lever-actuated locking bands or similar types, (3) expanding or crimped lids, (4) metal lugs or clips.

One characteristic advantage of fibre drums is the wide range of sizes available. For products of various densities, use of the commonplace 5-, 10-, 20-, 41- and 55-gal. containers often results in excessive outage or vacant space in the top. But fibre drums are made to fit the product with only a small safety factor added, thus saving considerable storage and shipping space. Depths are available to the desired fraction of an inch.

Common carrier regulations, as well as self-imposed safety standards adopted by the drum manufacturers, require greater strength for packaging liquids and semiliquids than for dry products. The old 5-gal. maximum for liquids in fibre drums has been amended. Fibre drums may now be used for liquids up to 400 lbs. (or 55 gal.) if built to comply with special construction and minimum strength requirements.

The requirements for packaging semiliquids in fibre drums are higher than for dry products, but not so high as for liquids.

To establish a line of demarcation between liquids and semiliquids, the rail and motor freight carriers have adopted a rule based on viscosity:

The term *semiliquid* is defined as referring to articles which have a minimum viscosity of 5,000 centipoises at temperatures up to 100 deg. F., exclusive of articles normally shipped under refrigeration, in which case the viscosity shall be measured at shipping temperatures; when the article contains a solid material susceptible to phase separation, the viscosity measurement is determined on the liquid component when this is greater than 10% by weight.

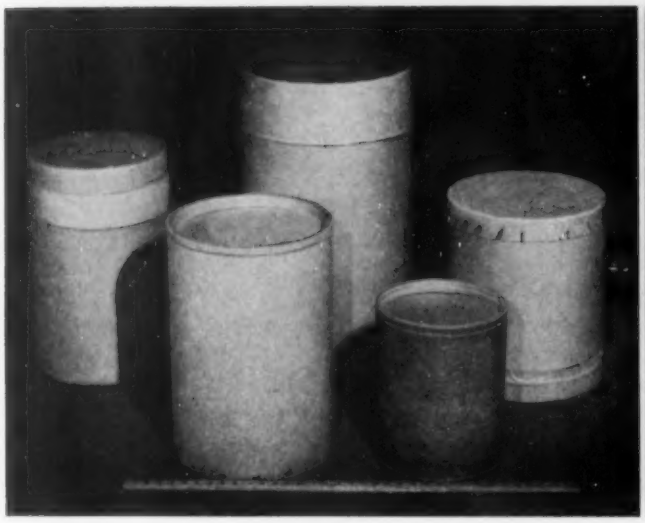
Hygroscopic, deliquescent or other extremely sensitive products are protected in fibre drums against water-vapor penetration in a variety of ways. Fibre-drum manufacturers utilize special linings, coatings and treatments or incorporate water-vapor barriers into the construction of the drum. Special drums may be built with a film of asphalted material or may be lined with polyethylene, saran, cellulose acetate, Pliofilm, aluminum foil, etc.

To meet specific requirements the interiors may be treated with paraffin or with other materials like special waxes or resins. The exteriors may be lacquered or coated with pigmented paints to give an attractive finish.

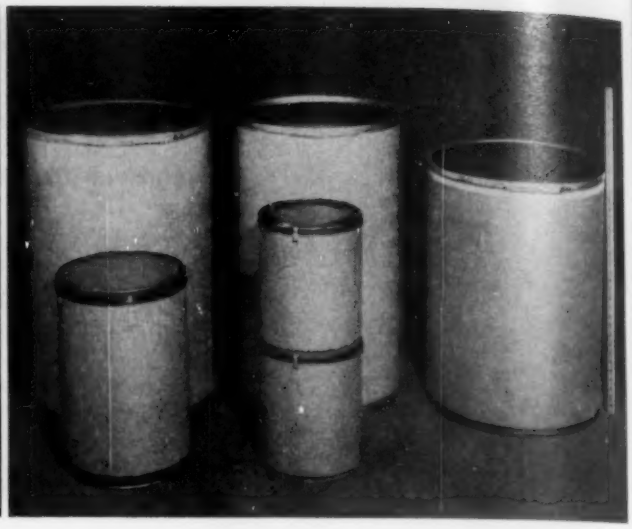
For many chemical, pharmaceutical and food classifications, fibre drums are preferred because of the protection afforded from contamination and because of their smooth, sanitary interiors. Certain chemicals requiring

* Managing Director, Fibre Drum Manufacturers Assn., New York.

FIBRE DRUMS—TYPICAL STYLES AND CLOSURES*

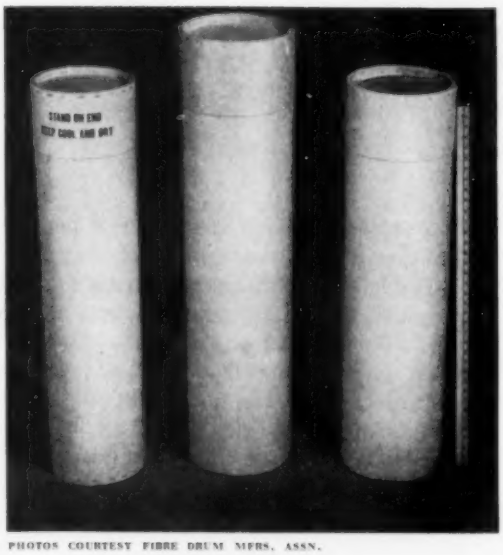


Typical drum styles made with fibre tops and bottoms. Can be sealed with tape; the recessed top and bottom styles can also be stitched or stapled.



Drums typical of styles with metal tops and bottoms. Shown are lug closures (front row); two drums with locking bands and drum usually tape sealed.

Three types of drums for roll materials. Strongly constructed to protect heavy items for domestic or overseas delivery.

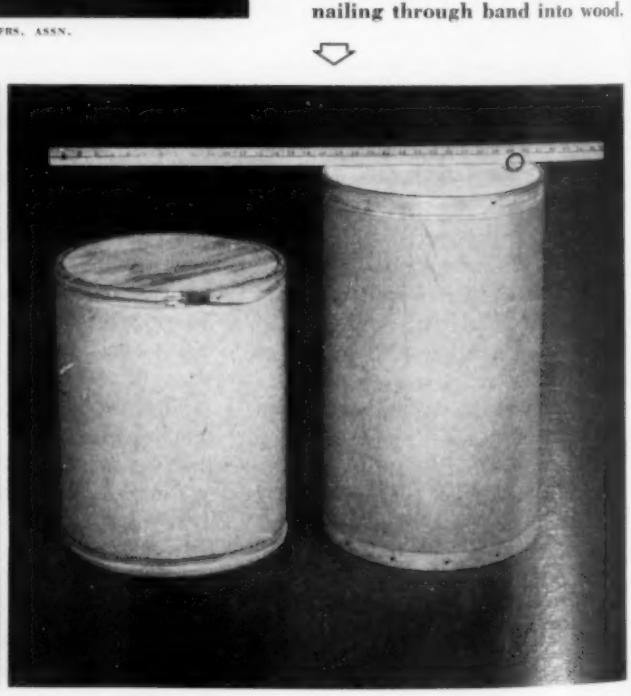


PHOTOS COURTESY FIBRE DRUM MFRS. ASSN.

Drums with metal bottom and a plywood top; reinforced fibre bottom, all metal top; fibre bottom with metal reinforced top. Various types of closures.

Drums made with wood or plywood tops and bottoms. Drum at left closed with lever locking band. Other drum is closed by nailing through band into wood.





* The models illustrated are representative of the frequently used types. Other styles, not shown here, are available for specific purposes.



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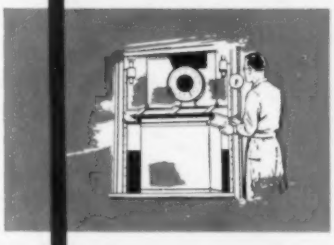
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protection from metals are shipped in fibre drums made either entirely from fibreboard or built in such a manner that there is no exposure of the contents to metal. In the transportation and handling of molding compounds for the manufacture of plastics, the protection from contamination provided by fibre drums is a very important economic factor in avoiding excessive spoilage.

Dehydrated foods, cocoa, flour mixes, toppings, spices, seasonings, meat-curing compounds and many similar items are marketed in siftproof fibre drums which are usually made vaporproof by means of barrier materials and tight closures. Bulk shipments of shortening, lard, vegetable cooking compounds, oleomargarine and related products formerly shipped almost exclusively in metal are now being packed in greaseproofed fibre drums.

Soaps, detergents, cleansers, sanitary chemicals, abrasives and many costly dyestuffs in dry form are shipped in fibre drums.

Asphalt, waxes and resins having a melting point of approximately 120 deg. F. and higher may be poured hot into fibre drums. Since these products solidify upon cooling, fibre drums for this class have distinctive features. Special interior treatments prevent the hot contents from bonding to the fibre side walls. Contents are removed by cutting away the container rather than by opening and then emptying through the top.

Fragile, delicate or high-value items are cushion packed in fibre drums, with coils of single-face corrugated, wadding, sponge rubber and similar cushioning materials.

For large rolls of cellophane and barrier materials (such as those covered by JAN-B-21 and MIL-B-131A, transparent film for auto safety glass, photographic film and other similar materials), fibre drums with recessed ends help assure safe delivery without damage to the edges of the rolls. Stacking on ends is preferred.

The packaging of food rations for the Armed Forces requires a special greaseproof paper, usually purchased in 36-in.-width rolls. The Quartermaster Food and Container Institute for the Armed Forces issued in January 1952 a military specification MIL-D-11706 (QMC) to cover fibre drums with recessed ends for this particular group of packaging materials.

Transportation costs are reduced and frequently both shipping and warehouse space is conserved by having empty drums shipped "nested" one within another. For example, certain chemical and food manufacturers package in 55-gal. drums. A 20- or 21½-in.-diameter drum may be delivered in a 23-in.-diameter drum. The three drum diameters with varying heights provide the identical shipping capacity.

The use of fibre drums for wire and other metal products has increased considerably in recent years. Heavy or high-density articles require a strong shipping container, and protection from corrosion is paramount. Fibre drums not only provide strength but also exclude water vapor—either by means of a pouch liner or by the incorporation of vapor-barrier materials.

Concurrently the use of a volatile corrosion inhibitor has become well known as a convenient and inexpensive method of rust prevention.

The Electro-Motive Div. of General Motors Corp., for example, makes effective use of fibre drums in shipping heavy replacement parts for diesel locomotives costing from $75,000 to $400,000. Cylinder heads, camshaft drive gears and other replacement parts are packaged in fibre drums with VCI paper. Before adoption of the fibre drums and the VCI paper, wooden boxes were used and the units were dipped in fingerprint remover, oiled and wrapped in waxed paper. The new method provides work-simplification economies both in shipping and receiving.

Since the effective use of VCI depends on having a tight container, the fibre drums have proved especially practicable for many applications in Electro-Motive's outstanding program of improved industrial packaging.

Among the small metal products shipped in fibre drums are rivets, eyelets, bottle caps, springs, chains, and a host of small stampings and machine parts. Larger items, such as metal tubing and wire in coils, where the cylindrical shape is particularly advantageous, are now shipped to a great extent in fibre drums.

Federal Specification PPP-D-723 consolidates, revises and replaces the older specifications for Domestic Type and Military Overseas Type. (JAN-D-111 and UU-D-723 have been canceled). ICC-21A and ICC-21B govern shipments of dangerous articles. For all other commercial freight by rail see Uniform Freight Classification No. 2; for motor freight, National Motor Freight Classification A-2.

PHOTOS COURTESY ELECTRO-MOTIVE DIV., GENERAL MOTORS CORP.





These VCI-lined drums ship parts for diesels valued up to $400,000 and protect them from shock and corrosion. Parts weigh 111 to 141 lb.; tare of containers is only 6½ to 9 pounds.



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Heavy-duty bags

by GARTH SALISBURY*

No exact line of separation can be drawn between what is referred to as a heavy-duty bag and a normal-duty bag for shipping bulk products. In a sense, practically all bulk-size shipping sacks are heavy duty, because they are specially designed to carry the specific product safely under normal shipping conditions, with a built-in margin of extra strength.

Any distinction must be arbitrary, and in this article any bulk shipping sack designed to carry 50 lb. or more is considered a heavy-duty package. Some bags, however, are designed to carry particularly hard-to-pack products or to meet unusually rigorous shipping conditions. These are the extra-strength bags.

* Bemis Bro. Bag Co., St. Louis, Mo.

Heavy-duty bags fall generally into three broad classifications, according to the materials from which they are made: textile, paper and laminated-textile bags.

Textile bags

The two principal textiles used for heavy-duty bags are burlap and cotton. Burlap is manufactured in various weights, commonly designated as either lightweight or heavyweight. Lightweight burlaps fall into the heavy-duty classification as it is established here, while heavyweights fall into the extra-strength category.

Burlap constructions are designated according to the weight of the goods in a given width. For example, 40-in., 10-oz. burlap refers to a piece of cloth woven 40 in. wide and weighing 10 oz. per running yard. Regardless of the actual width of the cloth, the expressed weight is based on what the weight would be if the cloth were woven 40 in. wide. Thus, 36-in., 10-oz. burlap weighs less than 10 oz. to a running yard 36 in. wide but weighs 10 oz. in a 40-in. width. This is usually indicated by expressing actual width and basis weight plus basis width, so that a 36-in., 10-oz./40-in. burlap is burlap woven 36 in. wide which weighs 10 oz. per running yard of 40-in. material. This distinction is not always made in this country, but is important in dealing with foreign trade, where the 40-in. basis width is not observed.

Lightweight burlaps range from 7- to 9½-oz. basis weights; 10- to 14-oz. burlaps are classed as heavyweights.

Burlap has exceptional strength, is highly tear and snag resistant, and withstands weathering well. It is available in special finishes, such as chested, cropped and mangled, which both improve the appearance of the goods and reduce sifting. Most burlap bags are brand printed in one to four colors, using special inks.

Cotton bags are of widely different constructions, including cambrics, percales, denims, Osnaburgs and countless others. Many of these can be called heavy-duty bags, but only the heavier Osnaburgs can really qualify as extra-strength bags. The principal constructions in Osnaburg are the 40-in., 1.76-yd. bag, which carries up to 200 lb. of flour for export, and the 2-bu. seamless bag for seeds and sugar.

Cotton constructions are designated differently from the burlap types. Weights are expressed in terms of the running yardage, in the actual width loomed per pound. A 36-in., 2.35-yd. Osnaburg would therefore refer to a piece of Osnaburg woven 36 in. wide and measuring 2.35 running yd. per pound of weight.

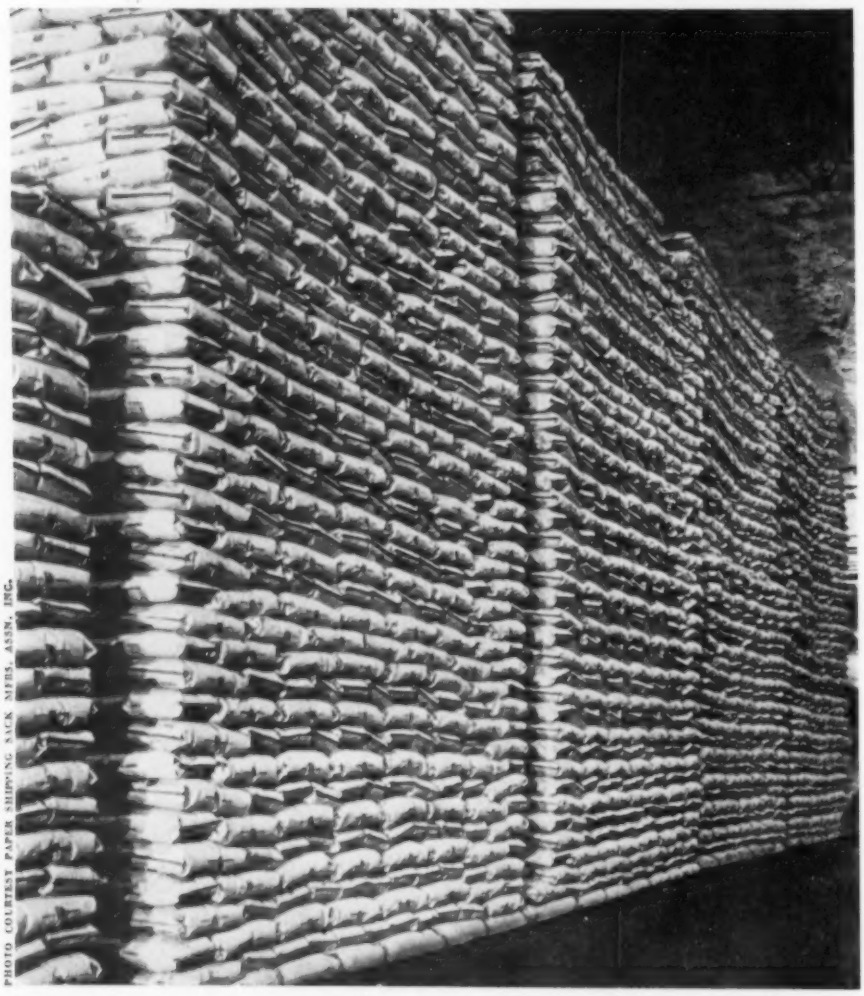


PHOTO COURTESY PAPER SHIPPING SACK MFRS. ASSN., INC.

Neat, dustless and secure warehouse stacking to any practical height is demonstrated in this warehouse scene showing "mountains" of filled multiwall sacks.

Multiwall paper shipping sacks

There are two distinct types of paper shipping sacks: the light-duty type constructed from one or two plies of paper, used largely for consumer-size packaging, and the heavy-

duty type, known as "multiwall" bags, made of three to six plies of paper and used largely for bulk shipments. Making a distinction among multiwall bags between light and heavy-duty types is particularly difficult, as there are so many different constructions with such a variety of built-in qualities that no classification is possible.

Multiwall paper shipping sacks are custom made. For practical reasons, they are rarely manufactured and stored in stock types and sizes, because each product has its own requirements. With very minor exceptions, each multiwall bag made has been designed and manufactured with a specific packaging job in mind.

Paper shipping sacks are generally constructed of paper in basis weights ranging from 40 to 60 lbs. Less commonly, 30- and 70-lb. plies are used for special purposes. The basis weight of paper is figured from the weight of 3,000 sq. ft., or one ream or 500 sheets of paper 24 by 36 in. A ream of 50-lb. (basis weight) paper would therefore weigh 50 lbs.

The type of paper used contains long fibres properly interlaced for maximum balanced strength and durability. This paper is distinguished from other kraft papers by its name (shipping-sack kraft) and is available in white, natural and colors.

Different weights of paper are frequently combined in one multiwall bag. Special kraft papers like waxed, asphalt-laminated or asphalt-impregnated, wet-strength or polyethylene-coated types are included in the multiwall construction as a separate ply or plies where certain protective features are needed. Other specialty papers, films and sheets may be used as an inner ply or liner, or protective sheets of this type may be laminated to a sheet of kraft paper.

Five major types of multiwall construction are available: sewn valve, sewn open mouth, pasted valve, pasted open mouth, and automatic (SOS) bags.

Sewn valve bags are closed at top and bottom by sewing, with a reinforcing tape. Provision for filling is made by leaving a valve opening in one corner. Special valve-filling equipment is necessary to fill these bags. The valve may be any of several types, depending on the nature of the product to be packed and other factors. Some valve styles have flaps, extended inner or outer sleeves, etc.

The pasted valve bag is manufactured by forming satchel folds at top and bottom and pasting. A valve opening is left in one corner. The characteristics and filling requirements are essentially the same as those for the sewn valve bag.

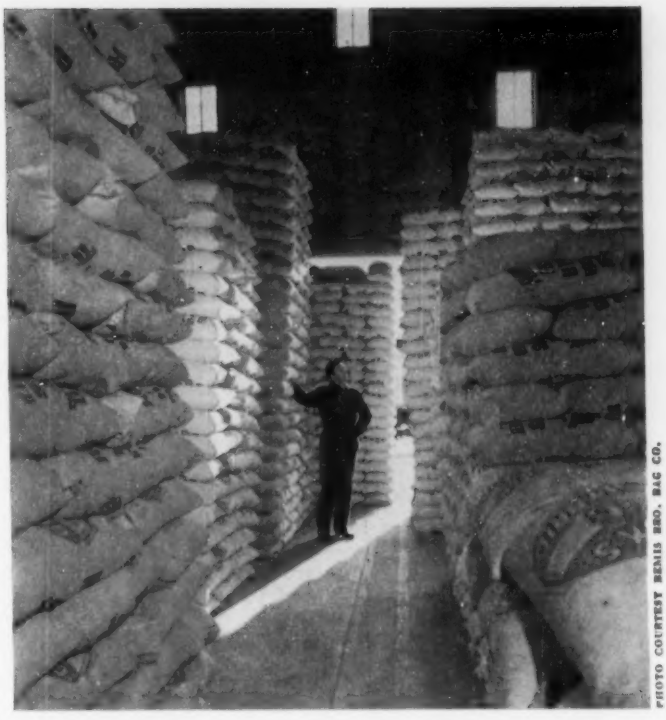


PHOTO COURTESY BEMIS BRO. BAG CO.

Cotton bags, woven on special looms to eliminate seams, are known for their strength and long-wear properties.

The sewn open-mouth bag has the bottom formed by sewing through reinforcing tape. The mouth is left open for filling. After filling, the top is usually sewn closed, although wire ties, glue, staples and gummed tape may be used to make the closure. This bag is normally gusseted.

Pasted open-mouth bags are made in flat tube form with a pasted satchel bottom. After filling, the top is usually closed with a wire tie. Less commonly, twine ties, glue, gummed tape, staples or sewing are used.

The automatic (SOS) bag differs from the pasted open-mouth bag in that it is gusseted and has a square-type pasted bottom. Top closure is made after filling by sewing, tying, stapling, taping or gluing.

There are numerous variations on these fundamental types of multiwall bags. For example, there is the sewn open-corner bag, which is made like a sewn valve bag except that, instead of a valve, one corner is left unsewn to provide an opening for filling. The corner is usually closed by stapling.

Some additional features incorporated in multiwall bags to meet special packing and handling conditions include special paste patterns, wax-dipped ends, reinforced bottoms and ventilation holes. There are also countless combinations of paper weights, special plies and laminations.

One outstanding example of a special construction is the laminated crinkled-kraft bag, having from two to six plies of creped-kraft paper sometimes called "secondary stretch paper." These plies are loosely bonded together with adhesive. The strength and stretch of the material enable the bag to withstand severe stress.

Plastic or other films, asphalt-



PHOTO COURTESY CROMWELL PAPER CO.

To reduce slippage, these bags have rippled surface embossed after the printing operation.



PHOTO COURTESY BEMIS BRO. BAG CO.

Use of polyethylene liners in multiwalls extends applications to products formerly needing rigid containers.

laminated crinkled paper and plastic-coated paper can be used in these laminated, crinkled multiwall bags.

Although not in a heavy-duty category themselves, plastic liners (notably polyethylene) are coming into wide use for shipping products in bags, drums, boxes, cartons and other containers. The liners lend the characteristics of the plastic to the original container, often putting the package into a heavy- or a special-duty class.

Polyethylene is colorless, odorless, tasteless, non-toxic, chemically inert, moistureproof, and highly resistant to alkalies, acids and other materials difficult to package. It retains its flexibility at extreme low temperatures and does not deteriorate with age. It may be readily heat sealed, providing an absolute closure against moisture, dirt or other contamination.

A polyethylene liner not only adds its own advantages to the container it lines, but also frequently permits the substitution of less-expensive containers which give more satisfactory service. Paper bags with polyethylene liners, for instance, can be used in many cases to replace a drum, barrel, can or glass container.

By permitting such substitutions, these liners can eliminate costly return problems. They can also eliminate cleaning problems for such materials as adhesives, shipped in drums, by protecting the inside of the container from direct contact with the adhesive.

Brief mention should be made of the bulk-size open-mesh bags, made of yarns twisted from a special type of paper known as "spinning kraft." These bags are used for bulk shipment of vegetables, generally packed 50 lb. to the bag.

The tightly twisted kraft paper used in these bags is highly resistant to abrasion. In addition to affording ventilation and visibility of the product packed, the bags' standard colors have been carefully developed to enhance the appearance of the contents —an important factor in shipping produce, which must sell largely on eye appeal while the produce is still in the shipping container.

When necessary, shipping-size open-mesh bags are treated for wet pack so that they can withstand icing in trucks and refrigerator cars. This type has become quite popular for packing products that require ventilation and they are the accepted standard package for shipping onions.



PHOTO COURTESY ST. REGIS PAPER CO.

Feed for livestock is a product that makes important use of multiwalls because of their sanitary and convenience features.

Waterproof bags

Maximum heavy-duty protection is furnished by the waterproof laminated-textile bag, in which one or more layers of stretchable paper or plastic film are bonded to a burlap or cotton fabric. From three to five layers are commonly used. As a rule the textile layer provides strength and the laminating and inner layers provide special protective features, as well as contributing to structural strength.

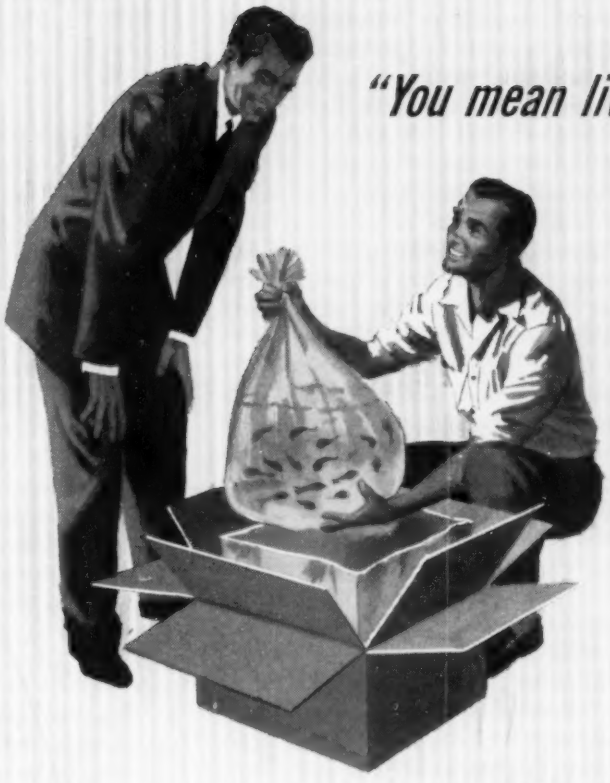
The inner ply or plies of a waterproof bag may be made from a wide variety of materials, depending on the protection required. It can be a laminated polyethylene film, Pliofilm, rubber-coated, a polyethylene-coated paper, or any of the many special or treated papers, such as parchmentized and waxed.

These bags are sometimes made with paper both inside and out, with a burlap layer sandwiched between. Besides providing an improved printing surface, experience shows that handling crews tend to regard these as paper bags and treat them more gently, especially on export shipments.

Almost any degree of strength and protection can be provided, using asphalt-composition adhesives, rubber or resin-base adhesives, or water-soluble colorless adhesives.

Waterproof bags also protect the product against contamination, insect infestation, loss of aroma, absorption of undesirable odors, gain or loss of moisture content and loss of contents from snagging or tearing. They are ideal for hard-to-pack and highly valuable products and for packaging to meet rough shipping conditions.

Waterproof bags are formed from the laminated material by either conventional sewing of side and bottom seams or with cemented seams and taped bottoms, which eliminate needle holes. Top closures are made by sewing, either with or without tape, by wire tying, or with dry-seal half-attached tape tops. Valved waterproof bags with intuck or inner sleeves are also available.



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Wooden shipping containers

The principal wood shipping containers are nailed boxes, plywood boxes, wirebound boxes, veneer packages, crates and crating, and barrels and kegs. Wood packages generally excel in two important respects—they are rigid and strong. Their utility for heavy-duty shipments and for certain special kinds of packaging (particularly farm products is unquestioned. Many wood containers are designed for multitrip use.

Nailed Wooden Boxes and Crates

by Wm. E. Hughes*

Principal products of the nailed wooden container industry may be classified as nailed and lock-corner wooden boxes, open crates and sheathed crates. All three types are made of sawn lumber and are rigid, rectangular containers.

Their shape permits solid, secure shipping and pallet patterns, with no void spaces and hence utilization of all available space. Rigidity assures product protection despite shocks or superimposed loads.

Nailed containers are readily available to shippers in an infinite number of sizes and, by the addition of refinements in thickness of parts, they may be designed to give any degree of product protection.

In addition to industrial packages, the industry also furnishes fresh fruit and vegetable containers, re-use containers and fancy boxes.

Manufacturers have cooperated for many years in formulating container specifications with the Association of American Railroads as well as with organized groups of fruit and vegetable growers and shippers. Rail tariffs have been published detailing approved container specifications for the shipment of fresh produce. These are contained in four railroad tariffs which together cover rail movements in the United States.

Fruit and vegetable containers are now as standard as five-dollar bills, so that most current work centers on the development of smaller-capacity produce containers, reflecting the new trends in consumer purchasing.

Re-usable containers include such forms as beverage cases, field crates, tote boxes and milk crates. Perhaps the most significant recent development affecting this type of container is the perfection of chemical substances used in treating the box material. A wide variety of preservatives are now available that can greatly extend the use life.

Fancy boxes include those made by the trade principally for packaging as opposed to packing. They are usually finely finished to emphasize the natural beauty of wood and are valued for shipping, storing and displaying such items as silverware, instruments, fine tools and cutlery. In addition to providing lifetime protection for the product, they are often designed for specific uses, for example, the boxes that serve as wall racks for knives.

Industrial containers. A number of adaptable specifications have been developed for nailed wooden boxes. These specifications are divided into two classifications—those for domestic transportation and those for export shipments. In addition, a number of Government specifications cover nailed wooden boxes and crates.

Selecting the container

In order to determine proper thickness of box parts and proper size of nails, it is necessary to consider two factors: the type of load and the species of wood used in the box.

Design of the container will be influenced by the characteristics of the product to be shipped, that is, the physical properties of the load, including weight, size, fragility, shape and capacity for supporting the container.

Container styles. All standard nailed wooden boxes are classified into eight styles. Chief differences among styles involve variation in construction of box ends in various styles, as follows:

Style 1—Uncleated ends.

Style 2—Fully cleated ends utilizing four cleats, butt joined.

Style 2½—Fully cleated ends with the two horizontal cleats notched into the two vertical cleats.

Style 3—Fully cleated ends with four cleats mitered.

Style 4—Two exterior vertical-end cleats.

Style 4½ (Reverse Style 4)—Two exterior horizontal-end cleats.

Style 5—Two interior vertical-end cleats either triangular or rectangular in shape.

Style 6—Lock-corner boxes with ends and sides fitted by tenons and glued.

Proper interior blocking and bracing within a nailed wooden box or crate are often as important as proper design of the outer container. Frequently materials other than wood are used and three methods of interior packing are employed: compression packing, suspension packing and a combination of the two.

Crates

A crate is composed of two ends, a base, two sides and a top. Open crates are composed of a framework of sawn lumber. The heaviest parts are found in the base which can be designed for dragging, sliding, handling by fork lifts or slings. Principal parts are corner posts, intermediate vertical members or cross members, horizontal members and diagonals.

Sheathed-crate construction is similar to that of open-crate construction except that board, plywood or some type of sheathing is applied to all faces of ends, base, sides and top—thus giving the contents complete protection from shock and weather.

Plywood Boxes

Plywood boxes consist of six cleated sheets or panels of box plywood. Cross-grain arrangement of the plies gives high strength in proportion to the weight and thickness. The commonly used plywoods are 2/4, 3/16, 3/12. For special containers and heavy weights 5/16, 5/12, 5/10 plywood may be used. The cleats are usually at least twice as wide as they are thick and vary from ⅝ by 1¼ to ⅞ by 3½. There

* National Wooden Box Assn., Washington, D. C.

are eleven (A through K) standard types of plywood boxes which differ principally in the cleat arrangements.

Plywood-box designs are freely altered and modified to meet product requirements. Intermediate cleats are often added to one or more panels. Special cleats may be used inside or out to support weight concentrations or for bolting. Cleats may be added for handling or for other purposes.

Cleated plywood boxes are used to ship articles covering a wide range of sizes and weights. They are rigid and offer excellent protection. The interlocking corner types are stronger, more difficult to assemble and to open, thus discouraging pilferage.

Wirebound Boxes and Crates

Wirebound boxes and crates are of patented construction and are made on special machines. The face boards or slats are thin veneer, resawn wood or laminated kraft and veneer with wood frames and cleats bound by steel wires stapled to the faces and to the cleats. Wire-bound styles are designated by the wire closures:

Style 1–Twisted wire closures.

Style 2–Looped wire closures.

Style 2A–Twisted wire loop closures.

Style 3–Looped wire closures and wired-end closures.

The cleats are either mitered or tongue and grooved. The end-panel designs are designated by letter and vary according to the cleat arrangements.

Many ingenious wirebound boxes and crates have been designed for special products and problems.

Wirebounds can be purchased in quantity and are shipped and stored flat. They are strong, economical, lightweight and time saving.

Veneer Packages

Veneer packages are made from rotary-cut lumber, or knife-cut lumber, as it is sometimes called, although they may also be made either from sliced or from sawed material. Veneer, as defined by the U. S. Forest Service, is any thin piece of wood which may be sawed, sliced or rotary cut. Just where the dividing line between veneer and resawed lumber lies has never been accurately defined, but anything less than ⅜ in. thick is generally classed as veneer.

Single-thickness packages may be produced in connection with wood head sticks on which veneer panels are stapled or nailed. The sides, tops and bottoms of the container may be of single-thickness veneer, as in the case of the wood egg case or pineapple crate, or a unitized veneer may be used in which narrow cleats or strips unite the sides, top or bottom into one piece, making it more convenient for the packer or shipper to assemble the finished package. For egg cases, the cover must extend over the entire top and be a clear piece of veneer, generally cottonwood, while the other parts of the container may be made of more than one piece of material–the latter, of course, represents an economy in manufacture. In egg cases, it is desirable to have an odorless and tasteless wood, which is why cottonwood is so often used. Many fruit and vegetable containers, which are subject to a great deal of moisture and rough handling, are included among the unitized veneer packages, examples of which are such popularly known shipping containers as pepper crates, vegetable crates, tangerine boxes and bushel crates.

In the large-container class, the most popular size is the 1-bu. basket of continuous-stave or short-stave construction with a solid, a built-up or a fabricated bottom. This construction is similar to that used for slack barrels, but the package is much smaller and usually does not have the liner type of construction.

Another broad classification of the veneer package is known in the industry as "small goods" and comprises berry boxes (both the pint and quart size) as well as the till (oblong boxes larger than quart size) and the climax baskets, which are oval veneer containers with a board bottom. In this country, the climax basket is usually made in 2-, 4- and 12-qt. sizes.

Tight and Slack Cooperage

by F. P. Hankerson*

There are two types of cooperage: tight barrels and slack barels. A tight barrel is what the name implies –liquid tight. It is usually employed for the packing, shipment and storage of liquids and semisolids, although it is occasionally used for the packing of heavy solids. A slack barrel is designed to hold dry products such as powders, bulk foodstuffs and metal products.

The majority of tight barrels are made from white oak, a strong close-grained wood that makes an ideal tight barrel. Red oak has the same general characteristics but is porous, and red oak barrels should always be lined when used for liquids. Douglas fir, while normally classed as a soft wood, makes an excellent tight barrel. It is lightweight and is in demand where weight is an important factor in shipping. Ash, gum and birch are used in tight barrels for packing household and food products.

Tight barrels and kegs range in sizes from 1 to 60 gal. or more. Standard sizes are 5, 10, 15, 20, 30, 50-55 and 60 gal. The 50-gal. barrel is the most widely used.

Tight barrels may require linings for certain products. Linings include glue, paraffin, silicate of soda and various commercial materials. No hard and fast rules can be given for linings, so it is wise to consult with a cooper, who will recommend the specific lining best suited for the product to be packed.

Slack barrels are made from a variety of woods and come in three grades: No. 1, Mill Run and No. 2. The No. 1 barrel is the top grade. It should be tongued and grooved and equipped with a moistureproof bag liner where protection against sifting, moisture or contamination is desired. The Mill Run barrel is not up to the standard of the No. 1 barrel, as ungraded staves are used just as they come from the mill. The No. 2 barrel is made from staves not suitable for No. 1 barrels and is used for packing household products, poultry, fruits and vegetables, metal products and the like.

Slack cooperage is furnished in a wide variety of sizes from small nail kegs up to huge barrels used for packing pottery and glassware. There are some 20 standard sizes.

If the contents require the utmost in protection from moisture, a bag liner is used. These may be obtained from the cooper, together with an inserting device. The cooper will be glad to instruct you in the proper method of using bag liners.

* Executive Director, The Associated Cooperage Industries of America, Inc., St. Louis, Mo.

Carboys—glass and polyethylene

Carboys are a specialized shipping container designed chiefly for the shipment of corrosive liquids. The standard carboy, which has been in use for many years, consists of a large glass bottle that is inserted in a box and cushioned with cork, rubber or other resilient materials. The term "carboy" refers to the complete unit, bottle, cushioning and box.

Carboys are used to ship liquid chemicals, especially acids, that require careful protection. The standard sizes are 2, 3, 5, 6½ and 13 gal.; and of these the 6½- and 13-gal. carboys are the most important. The 13-gal. size was adopted as the standard large size by the Manufacturing Chemists Assn. in 1936. Automatic machinery was developed to produce 6½-gal. acid bottles and in 1947 a standard specification was adopted for this ware and for a venting screw-cap closure.

The 6½-gal. bottle has proved a significant development and its importance is illustrated by its adoption for transportation of reagent-grade acids. Its chief advantages are found in greater ease of handling and storing. For example, a carboy containing 66 deg. Be. sulphuric acid in the 13-gal. carboy weighs about 265 lb. and about 135 lb. in the 6½-gal. container.

Carboys have a very long life, running at least five years and frequently up to 10 or more. For this reason the number of carboys produced annually is relatively small. Dollarwise, production is more significant and, of course, the cumulative number of carboys in use is very large. Carboys manufactured as long ago as 1914 are said to be still in use.

The trippage figures for carboys are estimated at 75 to 100 trips. This compares with 25 average trips reported for milk bottles, 20 trips for soft drinks and 18 trips for beer containers. Carboys thus undoubtedly last longer than almost any other type of container. There are several reasons for this. First, the container is initially expensive. Second, it is never handled by the public. Third, its contents are generally hazardous and expensive. Carboys are made for heavy-duty service and they are handled carefully by "experts." Thus production of new carboys is not related to use, as it would be if the containers were designed for one-time shipment and replacement.

When the products shipped in carboys are corrosive, poisonous, flammable or otherwise hazardous, the carboy must conform to specifications of the Interstate Commerce Commission. The ICC has developed tests for both new and used carboys designed to prove the ability of the complete package to withstand shocks encountered in ordinary transportation.

Polyethylene

Much interest has centered on the polyethylene bottle for carboys. One-piece polyethylene carboy bottles weigh approximately 4¾ lb. in the 6½-gal. and 9 lb. in the 13-gal. sizes. Average side-wall thickness is about 5/32 in. and minimum air-space allowance is 6 to 8% in the newest designs.

Special plywood jackets reinforced with highly chemical-resistant metal hoops are used with the bottle as returnable packages. The bottles are closed with a threaded polyethylene closure. Among the chemicals shipped in this ICC-IF package are hydrochloric, hydrofluoric and battery acids.[1] (See also, article on "Shipping Regulations," p. 677.)

Economy is achieved by lower shipping weights, elimination of breakage and ease of handling. Freight costs, reportedly, drop as much as 55% for empties and 20% for full units.

A different version is a 15-gal. box-shaped carboy used in shipping muriatic acid and other hard-to-handle chemicals.[2] The polyethylene liner is compression molded in two halves, joined by heat sealing the flanged edges of the halves and reinforced with a steel edging bolted together that completely rims the four sides of the container in a permanent mechanical seam. A detachable polyethylene pour spout is reversed in the container opening during shipment. A wooden shipping box completes the unit. Advantages are efficient payload and easy stacking for palletizing, etc.

The polyethylene carboy, although it is sometimes used for the same purpose as glass, was not designed as a substitute.

Polyethylene, like glass, has its limitations as well as its specific advantages. At the present time it has a higher initial cost than glass but its lighter weight and nonbreakable nature work in its favor.

Polyethylene is definitely limited in the range of products it will transport; however, the range of basic chemicals that find polyethylene practical is steadily increasing as test data and field experience are accumulated. Thus it has been determined that nitric acid cannot be put in polyethylene, but hydrofluoric acid can.

Another limitation sometimes suggested is the lack of transparency, although liquid levels can be seen readily through the translucent walls.



Highly corrosive hydrofluoric acid, formerly requiring expensive quartz or specially treated containers, is easily shipped and handled in these lightweight polyethylene carboys.

[1] See "Polyethylene Carboys," MODERN PACKAGING, Jan., 1954, p. 133.
[2] See "Square for Acids," MODERN PACKAGING, Jan., 1953, p. 113.

Industrial bags and covers

by PHILIP O. DEITSCH*

The term "industrial bags and covers" pertains to those bags, liners and covers especially designed for the packaging of odd-sized, bulky and hard-to-pack articles. Bags and covers included in this category are manufactured to meet specific individual requirements in regard to size and construction. They are largely hand fashioned or semihand fashioned, although a few standard sizes of machine-made bags are supplied. Even these as a rule are folded or pasted by hand.

Industrial bags and covers fill an important and growing need in the packing, protection, shipping and storing of items such as mattresses, furniture and similar bulky articles. They are economical and when correctly designed and used can efficiently supplement or take the place of more elaborate types of packaging.

The special advantage of industrial bags and covers is found in the fact that a wide assortment of measurements can be specified. Extreme exactness in designing, cutting, tacking and folding produce a cover that fits perfectly and gives complete protection.

Various types and grades of paper are used in the manufacture of industrial bags and covers. Heavy kraft in basis weights of 30 to 80 lb. (24 by 36 in. per ream of 500 sheets) is ordinarily employed. A multiwall construction of two or three plies is frequently necessary, depending on the amount of strength needed. Waterproof papers of various grades, plain, creped and reinforced, are frequently specified where water resistance is important. Several manufacturers have successfully employed transparent films such as polyethylene and vinyl for certain types of bags.

Although, as has been noted, many products of this industry are hand made or specially manufactured, several styles are regarded as standard. These include mattress and pad bags, can bags, upholstered furniture bags, casket covers, tubing, freight-car and ceiling liners, and waterproof case liners.

Mattress and pad bags. Bags of this style are usually machine made and, as the name indicates, they package mattresses, inner and box springs, upholstered pads and similar sleeping equipment. They are furnished in either multiwall or single-wall construction depending upon the degree of protection needed.

For example, mattress manufacturers use a triple-wall kraft bag to meet Consolidated Freight Classification requirements. Bags are of two sizes—53¾ by 6¼ by 80½ in. for standard-size mattresses and 38½ by 6¼ by 80½ in. for the twin size.

The bags perform a merchandising function as well as protecting mattresses from handling and dust. They are frequently brand printed on flexographic presses which use economical rubber plates. This type of press tints, colors and prints over an area as large as 8 ft. by 10 ft., 7 in. The printing is so scaled that the same set of plates can be used for both bag sizes, eliminating the need for duplicate plates and holding printing costs at an economical level.

The bags are fabricated with one end sealed. The flaps of the end left open are coated with a self-sealing cement that adheres only to itself. In packaging, the mattress is slid off the end of a sloping table directly into the open end of the bag, then the pre-coated flaps are folded down for an immediate seal. No stitching or other closure is needed.

Added to the basic economy of the mattress bags is their compactness (they are delivered to the factory folded), their light weight and the fact that they are ready to pack without any setting up or other preparation before being filled.

Can bags are described by the industry as paper bags designed and used for the packaging of empty metal or fibre cans. They are manufactured both automatically and by hand and are used in handling quantities of cans safely and economically—from the can-manufacturer's line to the intake end of the packager's filling line.

Upholstered furniture bags and covers. This type of packaging is available in one-, two- and three-wall constructions and in a wide variety of sizes to fit the many different types of upholstered furniture.

Casket covers are used mainly for protection against dust in shipment or storage. Here again one finds a large variety of sizes, further illustrating the wide range of paper cover sizes that the industry can readily supply.

Tubing. This type of flexible packaging is used for the protection of many different items, particularly those having a proportionally great lengthwise dimension. Tubing is sold in rolls, cut lengths and bottomed cut lengths with a maximum width of 12 in. and a 24-in. minimum length.

Freight-car and ceiling liners. Constructed from plain or creped asphalt-laminated waterproof papers in both the flat and reinforced grades, these liners serve as protection for raw materials and manufactured products against dirt, dust and vermin while in transit.

Waterproof-paper case liners. With a large proportion of today's packaging of a military nature, waterproof-paper case liners have taken on considerable importance, particularly in regard to overseas shipments. They are used in lining wooden, corrugated or solid-fibre shipping cases to bar the ingress of water. They are furnished in the form of bags, which, after being inserted into the case, are filled and sealed, thus assuring complete protection for the articles.

Waterproof-paper case liners are fabricated from the various grades of waterproof paper, depending upon the amount of strength and water resistance specified. Duplex and triplex asphalt-, wax- or resin-laminated papers and waxed and polyethylene-coated papers are some of the grades presently offered by the bag manufacturers. Of particular importance to users of this type of liner is Specification MIL-L-10547A, the document that governs all military procurements of case liners.

While the foregoing discusses some of the better-known bags and covers, it does not touch upon the myriad of individual packaging problems which the producers are called upon to solve. For today, bag and cover packages are designed and produced for such widely diversified items as pianos, automobiles, shrubbery, meat and all kinds of case goods.

* Administrative Officer, Industrial Bag and Cover Assn., New York.

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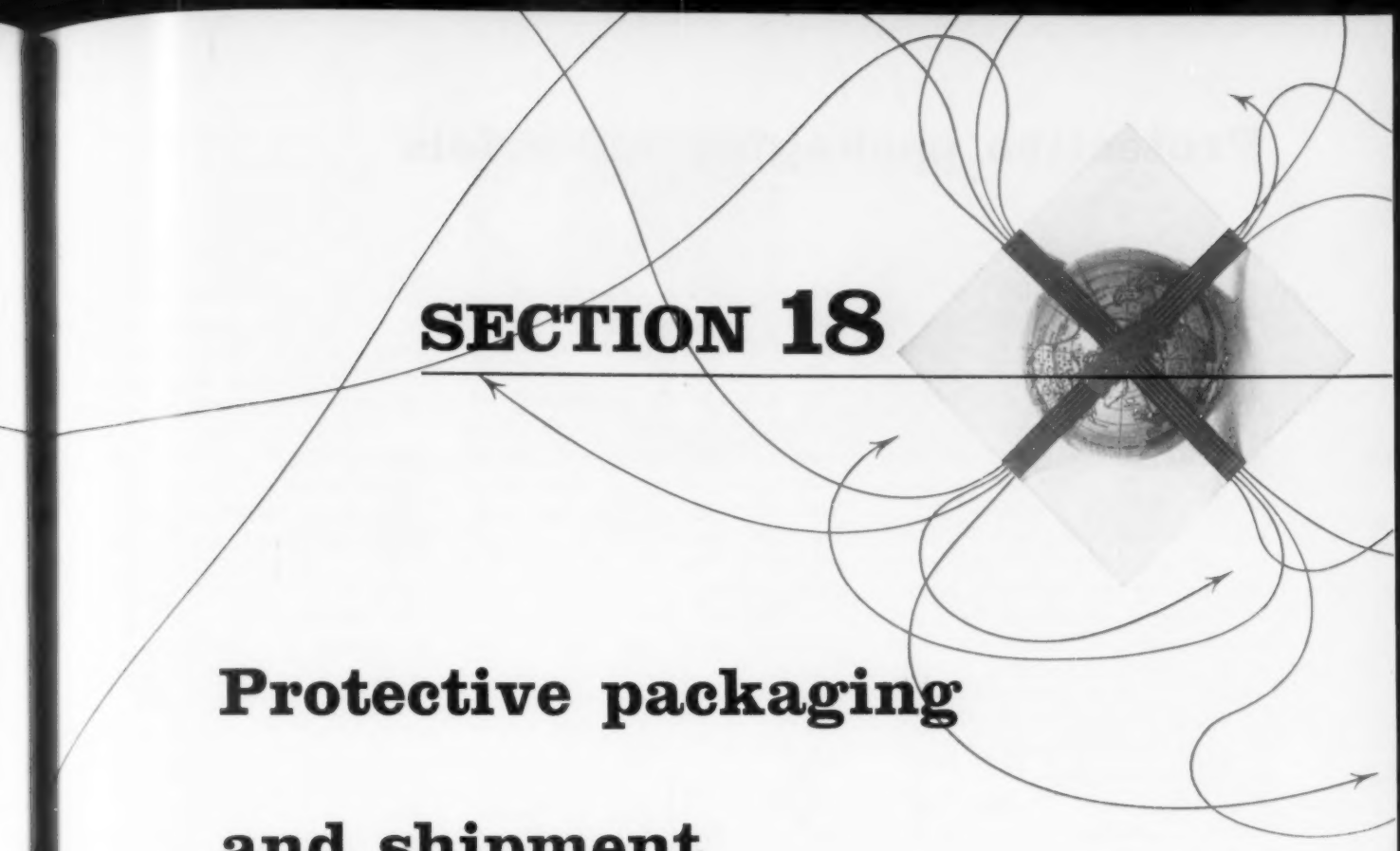
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Protective packaging and shipment

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Protective packaging materials

Protection is obviously a function of both the outer shipping container of a product and the associated packaging materials and tools, which range from interior fittings, such as bracing details, to external components exemplified by steel strapping. Efficient selection of outer shipping containers is not universally practiced, but is more common than proper engineering and use of allied materials, probably because the functional aspects of shipping containers have been better evaluated and publicized. This discussion will be limited to the subsidiary aspects of protective packaging and is predicated on the assumption that the external container has been properly selected.

A cardinal point frequently overlooked in protecting shipments is that the optimum choice of supplementary materials and devices presupposes a thorough knowledge of the item being packaged, its inherent properties and margins of safety; methods of storage, handling, shipment and distribution, and environment.

Protective packaging can be analyzed from various standpoints. One way of analyzing requirements involves the cataloging of the more common considerations and hazards dictating the choice of safeguards, a brief description of each and a listing of the categories of the basic materials which may be employed. (See chart, p. 655.)

1. Retention of the load. The conventional closure media include adhesives, metal stitches or staples, tape, metal banding and cordage. The last three play a dual role in that they also reinforce the container.

The major types of tape are paper, laminated paper with and without reinforcing fibres, cloth and pressure-sensitive tapes. (See "Tapes for Packaging," p. 176.) The distinction between stitches and staples is in the form in which they are supplied. Stitching is supplied in the form of a continuous coil of wire, whereas staples are purchased pre-formed. (See "Stapling and Stitching Equipment," p. 498.) Metal banding comes in round wire or flat strapping and is available in a range of gauges for the former and thicknesses for the latter.

2. Separation of the load to obtain optimum distribution is frequently effected by means of inner containers. These are commonly of wood, plywood, corrugated or solid fibreboard. Paper in the form of bands, wrappings, bags or envelopes is also used. The media associated with blocking, suspension and clearance include wood, corrugated and solid fibreboard and newsboard. Although almost any of the so-called protective materials can serve as dividers, separators and the like in addition to providing cushioning properties, the most common for this particular purpose are wood, veneer, corrugated and solid fibreboard, chipboard and molded pulp. Corrugated and solid fibreboard and, in some instances chip- and newsboard, can be procured in the form of partitions, trays, scored pieces, flange and extension pieces and corner pieces.

3. Support of the load against distorting forces such as compression and wracking may take the form of metal or wood frames, bases, skids, etc. Reinforcements lining the side and end walls also protect against these hazards, as do diagonal cross pieces within the container. In most instances these liners and diagonals are made from paperboard. Fibreboard or wood corner posts should not be excluded from consideration, but the cost of supplementary supporting devices must be evaluated.

4. Prevention of abrasion may involve positioning of the product so that finished surfaces do not come in contact with the shipping container nor interior packing parts; or it may comprise insertion of extra protective material between the finished surfaces and the packing element. Insert materials include cellulose wadding, which may be unbacked sheets, paper-backed and embossed sheets; macerated newsprint or excelsior within two retaining paper linings that are coated or impregnated.

5. Resistance to shocks. The basic principles followed in providing resistance to shocks and vibrations are:

[1] This article based on information supplied by Allyn C. Beardsell, Vice President, Container Laboratories, Inc., New York.



Performance of protective materials is given a real workout in this drop test conducted in an arctic room at the Quartermaster Food & Container Institute.

(1) Be sure that the maximum acceleration of the item in the package is kept at a level consistent with its own limitations and (2) avoid build-up of undesirable phenomena such as resonance. A wide range of supplementary packaging materials is available for protection against these hazards in handling. These cushioning materials include tension springs, cellulosic materials, excelsior, straw, hay, grass, shredded and macerated paper, vermiculite (a granular form of mica), sponge, foam latex and unicellular rubber, sawdust, wood shavings, animal hair, fibres such as cactus bonded with rubber cork, glass fibres, corrugated fibreboard in all forms.

Probably the most widely used cushioning material is corrugated fibreboard. There is an endless variety of forms—the commonest, scored sheets folded to form air cells and accordion-pleated pads with or without cut-outs to fit the packaged article. Blocks made from layers of corrugated board serve efficiently for heavy articles, such as refrigerators, stoves and motors.

6. Defenses against water, moisture and grease can be divided into several groups. One includes coatings, hot- and cold-dip strippable compounds and petroleum preservatives.

One good recent example of plastic-coating protection is the use made of a sprayed-on vinyl plastisol by Buick Motor Div., General Motors Corp. which adopted the coating as protection against scratches, nicks and dents for stainless-steel and chrome automobile moldings.[1] The vinyl plastisol coating is sprayed on cold and, after a brief exposure to heat, fuses to a tough, rubbery film that later strips off easily. The change-over from the paper tubing formerly used for the parts has also meant easier storage, for the parts now can be nested; easier identification; fewer man-hours devoted to packaging, and elimination of concealed damage.

The best exposition of cleaning and preservative methods and materials can be found in U. S. Army Technical Manual TM 38-230. With most of these coatings, supplementary greaseproof wraps are required (see Joint Army-Navy Specification JAN-P-121 for details).

Another group includes waterproof liners in the form of bags and overlapping seam sheets. These barriers sometimes are vented or remain unsealed. They are usually made of laminated, coated or impregnated papers which may be flat, creped in one or two directions, or occasionally reinforced with fibres in one or two directions. The coatings or impregnants may be wax, resins, etc., the barriers asphalt, film or foil. Informational references in this connection include Specification JAN-P-125 covering flexible waterproof barrier materials; JAN-P-117 for waterproof, greaseproof and/or water-vaporproof interior-packaging bags; MIL-B-131A for water-vaporproof barrier materials and MIL-L-10547A, which is concerned with waterproof case liners.

Plastic liners. In recent years the film liner has assumed new status for many kinds of bulk products on the basis of the convenience, cleanliness and wider choice of containers.

Polyethylene film liners predominate, but vinyl and other plastics are specified for particular protective properties. The round-bottom plastic liner for drums is preferred for liquids and the more costly powdered and paste products—particularly where product weights are heavy. Not only is it said to give better protection for such products than does the less

[1] See "Plastic Skin for Parts," MODERN PACKAGING, June, 1955, p. 100.



PHOTO COURTESY KIMBERLY-CLARK CORP.

Creped cellulose wadding cushions grinding wheels



PHOTO COURTESY AMERICAN EXCELSIOR CORP.

Pre-formed excelsior wraps simplify packing and unpacking. Users like wrap's cleanliness.

CUSHIONING MATERIALS—BASIC TYPES AND STRUCTURES*

Matted Fibre Structures[1]		*Cellular Structures*[2]		*Granular Materials*	*Corrugated, Creped or Solid Materials*	*Devices*
Cellulosic	*Animal Origin*	*(Moderately Resilient)*	*(Highly Resilient)*	Shredded rubber	Corrugated	Structural members of the container
Excelsior	Curled hair	Cork	Foamed rubber	Shredded plastics	Single faced	Blocking or isolating structures
Shredded paper	Felt	Wood	Shredded and rebonded rubber	Ground cork	Double faced	Partitions
Paper, pulp	Wool	Foamed polystyrene	Foamed vinyl	Popcorn	Double wall	Platforms
Maché	*Inorganic*	Foamed phenolics	Shredded and rebonded vinyl	Sawdust	Creped cellulose wadding	Dividers
Wood felt	Glass			Vermiculite	Paperboard	Springs
Tula	Metal				Fibreboard	Canvas slings
Bagasse	Asbestos				Molded pulp	Inflated plastic cushions
Cotton					Rubber structures	
Jute					Plastic structures	
Flax						
Straw						

* Also see the chart "Properties of Selected Cushioning Materials," p. 672.
[1] There are three types: fibres matted without bonding; fibres with semirigid bonding; fibres matted with rubber or similar elastomeric bonding.
[2] Open cell or closed cells.

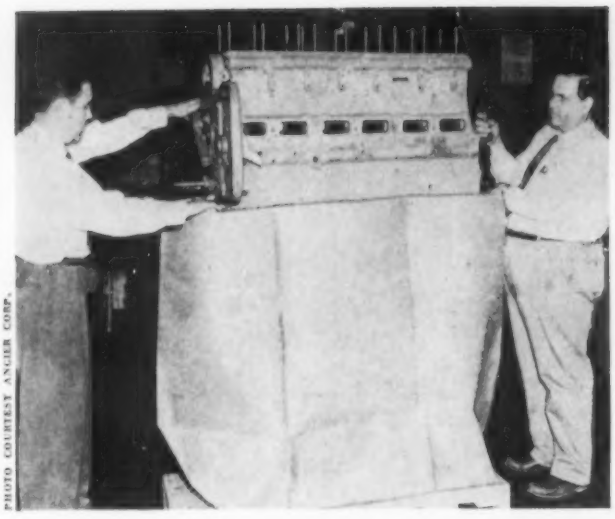


PHOTO COURTESY ANGIER CORP.

Custom-made VCI bag packages huge diesel-engine block. Treated bag prevents rust; eliminates need for oil dip and cleaning; reportedly cuts handling costs by 58%.



PHOTO DAVISON CHEMICAL CORP.

Desiccant in this package-humidity indicator is visible through glass top; changes color when inside atmosphere reaches the critical moisture point.

costly flat liner, but in the case of liquid products it has opened the way for packagers to consider lighter-weight, cheaper shipping containers.

Several varieties of cylindrical liners are now available, from one which has a disk of polyethylene sealed to the body of the liner to one which consists of a fibre disk, inserted between two layers of polyethylene, forming the circular bottom. Such liners range in gauge from 0.0015—for smaller drums and less-corrosive products—to heavy 0.006 gauge for highly corrosive products. Most often they are used with drums ranging in capacity from 15 to 55 gal.

Cylindrical liners are said to be easier to insert, chiefly because the mandrel required to install conventional flat liners is not necessary. Inserting the liner, without mandrel, is accomplished by merely sweeping it through the air to capture a certain amount of air, gathering the top together and using the air cushion itself as a mandrel. Not only is this method fast and effective, but it protects the liner from the abrasive action of a mandrel. Round-bottom liners are also said to avoid the creases which sometimes result in leaks.

Film liners are used with metal drums and pails, fibre drums, fibreboard shipping cartons and multiwall bags. Foods, chemicals and other products use the liner to advantage, particularly dusty, sticky and volatile liquid products. Not only is better protection afforded, but 100% recovery is assured and the problem of cleaning re-use containers is eliminated.



PHOTO COURTESY UNION BAG & PAPER CORP.

Pre-cut honeycomb buffer pads speed packaging operations and prevent damage to books in transit.

Since corrosion rarely occurs without the presence of moisture, a low relative humidity must be maintained within the package. This will prevent condensation of moisture on ferrous metal parts when changes in temperature occur. Water-vaporproof barriers are utilized to enclose the packaged item in the form of bags, liners or pouches. Closure is usually accomplished by heat sealing after entrapped air is exhausted by vacuum suction. The materials used for water-vaporproof barriers include lead and aluminum foils, paper or scrim backed; laminated polyethylene, etc.

Desiccants. When the volume of air enclosed in the barrier is relatively large, it is common practice to use a desiccant to maintain the relative humidity at or below approximately 30%. The amount of desiccant needed is computed taking into account the water-vapor transmission rate of the barrier material, the area of the barrier itself and the amount of dunnage enclosed. Silica gel and montmorillonite are the most common products used in dehydrated packs. Reference material is contained in military specification MIL-D-3436.

Packaging with desiccants is now a tested and well-understood technique. Included among the products now protected in this way are such widely diversified items as delicate instruments and radio equipment packaged for overseas shipment, hard candy, potato chips, vegetable seeds, etc.[2]

Volatile corrosion inhibitors (VCI) are relatively new in the protective-packaging field. Two processes are used in producing VCI for packaging: One applies a coating to materials such as kraft paper, the other involves impregnation of fibrous materials. VCI papers should be placed as close to all surfaces of the item as possible. VCI packaging is primarily designed for the protection of iron and steel parts and care should be exercised in its use to protect nonferrous metals as well as nonmetallic surfaces, although aluminum parts appear to be protected by its use.

Volatile corrosion inhibitors derive from a certain class of chemicals, the most familiar of which are dicyclohexyl-ammonium nitrite and sodium nitrite urea. These chemicals give off a vapor that inhibits corrosion of ferrous and certain other metals.

Military Specification MIL-P-3420

[2] See "Trends in Dehydrated Packaging," MODERN PACKAGING, April, 1953, p. 200, and "Desiccants for Drugs," MODERN PACKAGING, Feb., 1953, p. 86.



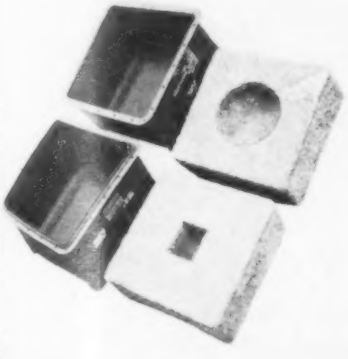
Biondulated cushioner has permanently crimped forged fibres for excellent cushioning and recovery.

in 1951 first recognized VCI, but set limits on its use pending completion of exhaustive tests. With its 1953 inclusion on the Government's Qualified Products List and the issuance of Ordnance instructions and Navy Bureau of Aeronautics Specifications, VCI now is a full-fledged method.

VCI has spread rapidly through industrial and military packaging and is now beginning to appear in consumer packaging. Today no packager shipping products or parts of ferrous metals, subject to corrosion, can afford to overlook its possibilities.[3]

Wherever it can be used, this simple method has proved far preferable to the old rust-prevention system of dipping in oil or coating with grease, which then required greaseproof packaging and, upon unpackaging, a

[3] See "New Uses for VCI," MODERN PACKAGING, Oct., 1953, p. 156.



Dunnage pads of molded animal hair cradle delicate radar components in steel shipping containers.



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about delicate items arriving in good condition. Pack ampoules, lipsticks, tubes, pens, vials, electronic components or any fragile item with our RONDO tray insert. Although these trays are lightweight they give full protection and may be packaged attractively. Write for literature or tell your problem to our engineering department and let us design a RONDO tray to meet your packaging need.

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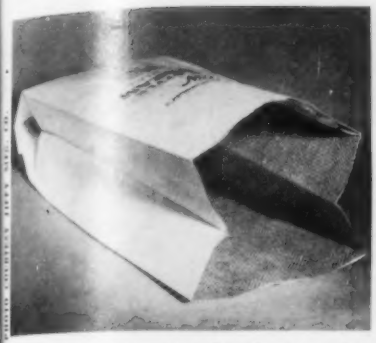
messy job of clean-up before the part could be used. Military packaging authorities were convinced of its value when Army Ordnance demonstrated that a rifle coated with grease required 2 hrs. and 45 min. for cleaning and re-assembly, while the same rifle in a VCI paper bag was ready for action in seven minutes.

A simple coating on kraft paper is still the most common form of VCI.

But now greater convenience and utility are being provided for the ever-widening industrial and consumer applications through the fabrication of such papers into bags, envelopes, die-cut folders, drum liners and carton liners. Impregnated wadding and cushioning pads and envelopes are available. VCI chemicals in crystalline and powder form–the latter applicable by spraying–are increasingly being used.

Whether VCI or one of the other methods mentioned is chosen to inhibit corrosion, it is essential to follow established cleaning methods before packing the article to be protected. None of these methods will remove rust and they are less effective when corrosion has developed in the article before packaging. Grease-resistant materials such as laminated films and foils, wax-impregnated or -coated papers, glassine or other paper products, either in sheet form or incorporated in interior unit containers, are generally used to retain light oils on protected parts. These same materials retain essential oils in packaged food products and prevent dissipation of such necessary and everyday staples as lard.

7. Safeguards against temperature extremes. The principles incorporated in the prosaic thermos bottle are often embodied in protective packaging to safeguard against extremes of temperature. Materials used to surround the packaged item and create insulation or dead air include built-up corrugated fibreboard forms identified by various trade names, macerated newsprint between two paper facings furnished in liner or bag form, glass-fibre materials, mineral-wool mats and pads and, for some of the larger articles, various types of quilted pads. Lead or aluminum foil, laminated to inner or outer surfaces of other packaging media, are sometimes applied to serve as a reflector and thus reduce undesirable temperature changes. Precooling or pre-heating of the entire package immediately before packag-



Low-cost bag gives insulated protection for store-to-home trip.

ing for shipment, or use of dry ice, are other methods employed to minimize product spoilage.

Scientific approaches

There are a number of basic considerations in developing suitable protective packaging and a great many materials or combinations of materials to choose from. (See "Engineering the Industrial Package," p. 666 and "Packaging the Ultra-Fragile Product," p. 668.) Source material also is contained in such publications as the railroad, Railway Express, Parcel Post and other carrier regulations. The government specifications issued under the JAN and MIL series are extremely helpful. Articles in MODERN PACKAGING magazine and similar trade publications are extremely useful in keeping abreast of new developments. Many excellent brochures are available.[4] Walter Stern's book, *The Package Engineering Handbook* (which is published by Board Products Publishing Co., Chicago, Ill., 1949), provides some basic information on packaging forms and methods.

However, these sources by and large either set forth minimum requirements or desired end results and tend to ignore a fundamental approach to packaging problems. One of the first and probably still best of the publications dealing with protective aspects of packaging is R. D. Mindlin's *Dynamics of Package Cushioning*. This paper, published (1945) as Bell Telephone System Technical Monograph 1369, develops a rational approach to the design of protective cushioning.[5]

[4] A comprehensive listing of manufacturer's literature appears as a regular monthly feature in MODERN PACKAGING magazine.

[5] The reader is referred to the article "A Mathematical Approach to Cushioning," MODERN PACKAGING, May, 1953, p. 133, a study based on Mindlin and other sources. See also "A Package Cushioning Monogram," MODERN PACKAGING, Aug., 1954, p. 124, which discusses a single alignment chart and offers new simplicity in the calculation of cushioning needs.



PHOTO COURTESY ACME STEEL CO.



Three steel straps are applied simultaneously to bulk textile shippers by this automatic strapping machine.

PHOTO COURTESY ACME STEEL CO.



Strapping machine designed for volume operations produces spot-welded joint. The operation is practically effortless.

Steel strapping

In the application of steel strapping, correct placement of the strap in relation to container areas is of great importance for maximum protection. Some recommended steps follow:

1. Two girthwise straps are the most effective reinforcements for rectangular containers. Straps should be placed one-sixth of the total length from each end. This will give maximum support to the container.

2. Straps should always be tensioned around any container in *a straight line* to avoid slack. On square containers two encircling straps, placed at the center of the box sides, will evenly distribute reinforcement over the entire box surface.

3. On heavier containers of rectangular shape, four straps may be advisable. These straps should be placed one-sixth of the total length from each end. The steel strapping should always be drawn taut on fibre containers and indent the edges of wooden boxes.

4. Steel strapping should be applied to wood boxes just before shipment to eliminate slack due to shrinkage of the wood. On export shipments always drive staples across the strap at 6-in. intervals to prevent snagging.

Packages. Steel strapping is readily adaptable to all types of packages—long and narrow, short and thick, light or heavy, of usual or unusual shape. A steel-strapped package will discourage pilferage or partial removal of contents. Serially numbered seals are available as a further discouragement against tampering.

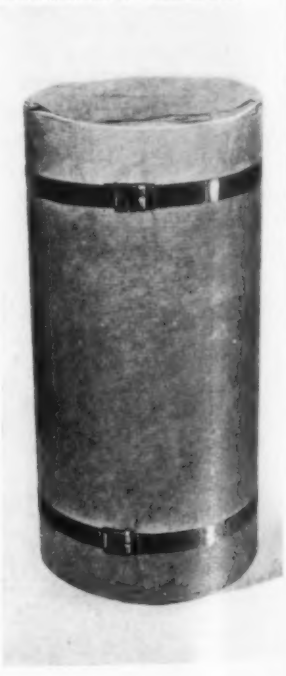
Cartons. The Consolidated Freight

PHOTO COURTESY A. J. GERRARD & CO.



Modern equipment like this makes strapping an easy job. Strap is cut to length; seal is slipped on strap and the strapping is then looped through seal.

PHOTO COURTESY A. J. GERRARD & CO.



Strapping lends itself to various shapes, cylindrical, rectangular, etc.—solving many packaging problems where previous methods have failed.

Classification permits steel-strapped cartons of certain commodities to be oversize and overweight. This gives the shipper a reduction in container and freight costs. Shape, size or weight of the carton does not limit the use of steel strapping—often lighter-weight fibre or corrugated cartons will carry merchandise safely when strapped.

Boxes. Strapped wood containers are economical for shippers of many commodities. Tests show that the thickness of lumber required may be safely reduced 20 to 40% if the box is properly strapped with steel.[1]

Bundles. Bundles of hard-to-pack, hard-to-handle commodities can offer ideal examples of practical steel-strap usage. Many products properly stacked or bundled into a compact unit need only encircling steel bands as protection against damage. Scythe handles, brooms, auto springs, ironing boards, stepladders, hides, paper rolls, sheet steel and hardwood flooring are among the many products which make practical use of steel strapping in bundled shipments.

Crates. Many volume shippers of crated or partially crated products recognize the economical possibilities of steel strapping when designing their containers. As in wood boxes or cartons, packaging engineers can design the crate with a minimum amount of lumber for weight reduction and still provide complete protection with proper steel strapping. Auto parts, stoves, refrigerators, utility cabinets, wood veneer, steel disks, furnace grates, heaters and gasoline engines are some of the products for which strapped crates are doing the job better.

Bales. Certain compressible products may be most economically and satisfactorily baled and strapped, thus eliminating container cost and effecting a reduction in freight rates. Steel strapping wth curved edges is manufactured expressly for baling use. When tension is applied, the curved edges of the strap hug tightly into the bale, thereby reducing the possibility of snagging and tearing.

Skids and pallets. Products with great weight and bulkiness that can be packed and shipped as a unit are usually most economically protected and easily handled in transit by securing the shipment to a skid or pallet with steel strapping. Industries such as steel, paper, automobiles, printing machinery and allied products, and freight transfer stations have reduced by millions of dollars former packaging and shipping costs through skidding or palletizing their shipments. The steel-strapped skid or pallet stacks easily for warehousing or carloading and is easily handled in intraplant movement. Flat paper stock, gas meters, railroad car parts, fire bricks, office furniture and cartoned products are good examples of products adaptable to steel-strapped skid or pallet loading.

Carloading. Materials shipped in carload lots in either boxcars, gondolas or flat cars usually require bracing or bulkheading for two basic reasons: (1) to control or prevent shifting and damage and (2) to keep the load integrated for ease in unloading at delivery point.

Heavy-duty steel strapping provides a completely flexible and economical means of doing this. The use of steel strapping permits tremendous strength and holding power with a minimum of dunnage—30 lb. of steel strapping may do the same work in protecting shipments that formerly required thousands of pounds of wood.

[1] U. S. Forest Products Laboratory.

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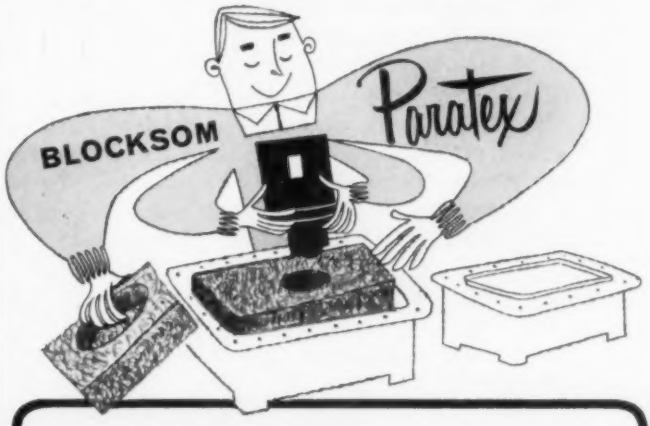
Reprints of articles, features and news items that appear in Modern Packaging are often surprisingly inexpensive when ordered in quantity. Many companies make it a practice to have stories which have a bearing on their business reprinted for distribution to their own personnel, customers, prospects, stockholders or to other interested groups.

Whenever you see editorial matter of this type in Modern Packaging magazine or the Encyclopedia issue which you can use in reprint form, in quantities of 100 copies or more, write and quotations will be furnished promptly.

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Trends in industrial packaging

During the last 10 years industrial packaging has grown to unprecedented heights and has taken on a far more scientific and exacting bearing than ever before.

An indication of this vast growth is seen in the experience of Chevrolet which is now packaging or identifying 13,649 parts or 61.95% of the 22,029 parts now in service.

Industrial packaging is the kind that seldom, if ever, goes to the retail shelf; industrial packaging is concerned with transit more than with trade up; it weighs protection, convenience and economy far more heavily than eye appeal.

Significantly, it is no longer a backroom problem devoid of management consideration. Industrial packaging during the last decade has become an engineering science—a profession worthy of management respect because it is a long-neglected field of cost cutting and sales building.[1]

One of the most important things that the industrial package requires is obviously better protection. In many instances, manufacturers, through a continual reappraisal of their packaging methods, have introduced techniques that not only save money but offer superior protection.

It is also essential that the industrial package be properly engineered for convenience in handling. The tremendous volume of material moved by industry must be transported swiftly, economically and with a minimum of labor. It must also be packaged to fit into the materials handling set-up and out-of-plant distribution system through which it must move.

The industrial packager also recognizes the need for proper identification of the product. He knows the identity of the product, as well as that of the manufacturer, must be maintained up to the point of use by the consumer. Many savings are thus effected in receiving, warehousing, shipping and selling by proper identification, over and above the advantage of establishing trade names.

Many industrial users are becoming design conscious and for good reason. Companies like Behr-Manning Corp., Troy, N. Y., have found that a package designed for industrial distributors may prove less than satisfactory if and when the product should be sold through retail outlets. A telescoping set-up box used for the company's sharpening stones was stepped up in appearance to serve the needs of the industrial distributor and to hold its own in the keenly competitive self-selection hardware store.

The biggest force in industrial packaging today is the development of new materials—and new ways of using old materials.

The volatile corrosion inhibitors eliminate the expensive trappings of Method II packaging and offer long-term corrosion prevention for ferrous parts.[2] A simple coating on kraft paper is still the most commonly used form of VCI, but greater convenience is being offered through the fabrication of the papers into bags, envelopes, die-cut folders, drum liners and carton liners. Impregnated wadding and cushioning pads and envelopes are available. VCI chemicals in crystalline and powder form—the latter applicable by spraying—are increasingly being used.

Molded polyethylene containers are replacing heavier carboys for shipment of valuable or corrosive chemicals and a combination of steel-polyethylene drum is creating a stir—all in the interest of lower freight, greater safety and better product protection.[3]

There are few users of drums who are not using or considering using disposable film liners of polyethylene, vinyl or other plastic—whenever it is important to keep the product pure, leakproof, free of contamination and easy to handle.[4]

Cellophane, too, was only for consumer packaging until along came the idea of collecting and sealing in cellophane envelopes all the parts for small metal assemblies—assuring the right

[1] See "Industrial Packaging," MODERN PACKAGING, Sept., 1955, p. 101.

[2] See "New Uses for VCI, MODERN PACKAGING, Oct., 1953, p. 156.

[3] See "Polyethylene Shippers," MODERN PACKAGING, Oct., 1953, p. 133.

[4] See "New Status of the Film Liner," MODERN PACKAGING, Oct., 1953, p. 144.

PHOTO COURTESY HINDE & DAUCH



Small grease fittings are unit packed on a reel.



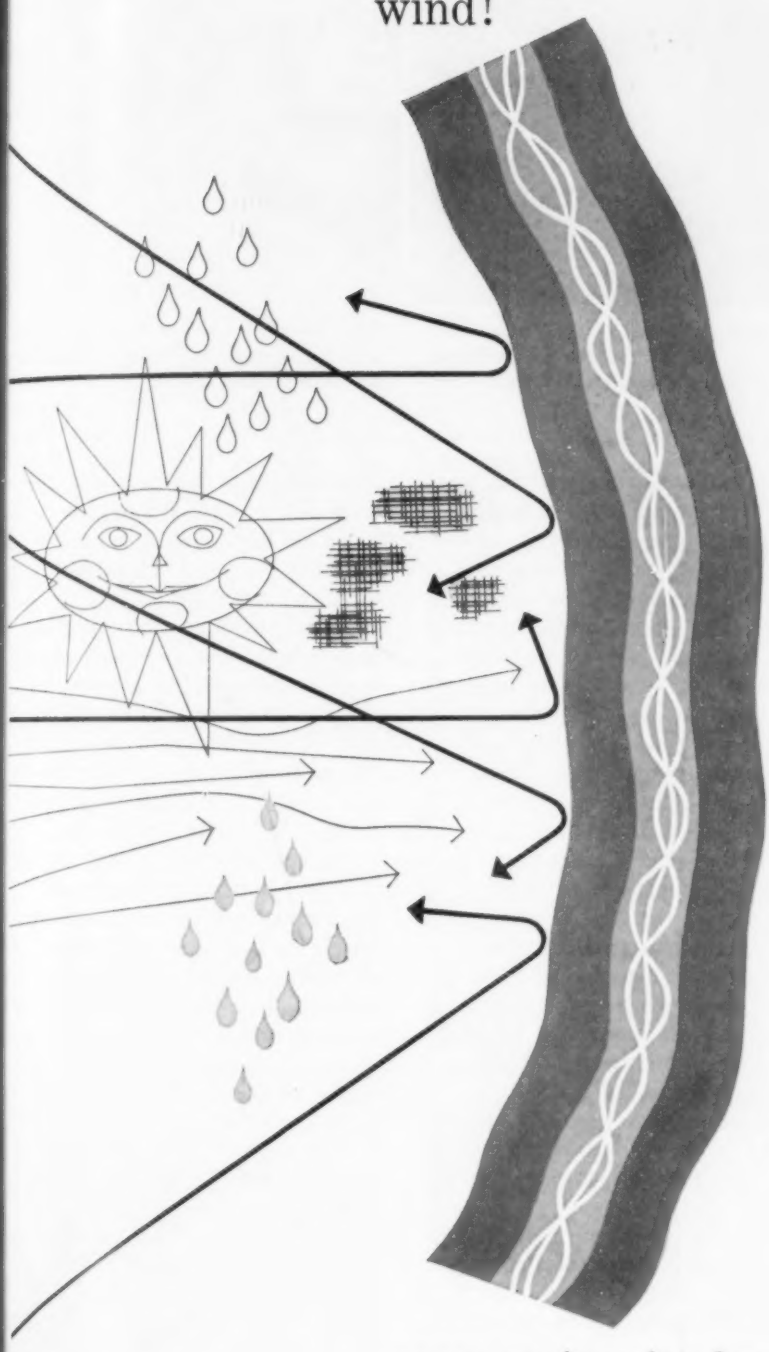
Heavy-duty corrugated carton permits safe, compact shipment of 100-lb. lots of nails or similar items.

PHOTO COURTESY MINNESOTA MINING & MFG. CO.



Resistors are fed from a reel automatically like machine-gun bullets.

this wrap-around shield keeps out more than wind!



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parts in the right number for the right job, easily identifiable through the transparent film.[5] Machines have been developed for this kind of unit packaging that will sort and collect, fill and seal the proper variety of small parts.

Paper has become a far more versatile material for shipping and industrial packaging. Coatings with polyethylene and other resins provide low-cost moisture and water-vapor barriers, whether used as wraps, made up as envelopes or bags or case liners.

There has been a noticeable trend toward the use of flexible corrugated both as hand wraps and as prefabricated bags and envelopes. Lower labor cost, difficulty of obtaining experienced help and better product protection are reasons most frequently advanced for this trend.

Perhaps the most obvious trend of all in shipping containers is a swing toward corrugated boxes for many kinds of jobs which previously were considered beyond their capability. Special heavy-duty construction, providing up to six thicknesses of board gives the necessary rigidity and strength.[6] In practically all places where fibreboard is replacing wood, the opportunity for printing the containers to promote name and trademark is a factor, showing growing cognizance of the "sell" aspects among industrial and shipping packagers.

Metal is once more freely available to the industrial and military packaging engineer and this has led to much wider use of hermetically sealed metal cans and drums for corrosionproof, long-term packaging of metal parts and assemblies, ranging from ball bearings to aircraft engines. Metal-end fibre cans with a foil ply in the side wall also have gained considerable use as military barriers. The Air Force is using metal cans and drums to package parachutes[7] and for long-term storage of clothing items.

As far as water-vapor barriers are concerned, for metal parts, the flexible barrier materials—improved with the addition of polyethylene to the lamination—certainly have their adherents and there has been a revival of interests lately in plastic strip coating, involving either a new and improved butyrate material or ethyl cellulose.

Industrial and shipping packagers are also taking advantage of the properties of aluminum foil. Foil-laminated fibre drums have made their appearance on the West Coast, being used as single-trip containers for oils and greases. For domestic shipments of metal parts, a wrap of dead-folding aluminum foil, frequently trademarked by embossing, will provide grease-proofing and corrosion protection.

Developments in metal drums include a new lighter gauge, designed to be used with a plastic-film liner, and four-color all-over lithography is producing for companies such as Rohm & Haas some of the most beautiful containers in the bulk packaging field.

In line with the new scientific approach to shipping packaging, there has been great interest in adequate cushioning materials. (See "Protective Packaging Materials," p. 654.)

The old method of nesting a fragile product in a great mass of loose cushioning material seems rather costly and on the way out.

There is an increasing tendency toward pre-engineering of corrugated industrial packs to fit the product as a part of the original product planning, rather than saying to the box supplier, "Here is the product; give us the right kind of package for it."

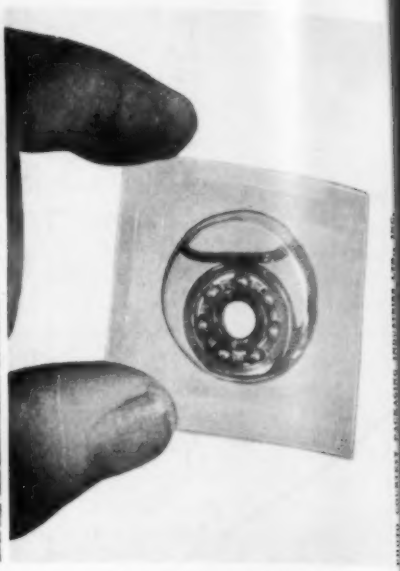
There is certainly a much greater awareness in the last few years of appearance factors in shipping packages. Examination of any mixed warehouse today will show few corrugated shippers lacking a printed trademark and some "sell" copy and many use two and three colors and sometimes a solid-color background. Printing on corrugated has made great strides. Pictorial effects approaching the detail of halftones[8] are now possible.

Opportunities for the use of automatic machiney in shipping packaging have been limited, but progress is being made in stride with the greater awareness of the challenges in this field. There is now in use an automatic case sealer to seal flaps of corrugated cartons, big enough to handle major appliances such as washing machines and refrigerators. Automatic machinery for in-plant production of corrugated cartons to a wide range of specified sizes to fit odd-sized shipments with a minimum of waste is now reported in use in many plants.



PHOTO COURTESY WIREBOUND BOX MFRS. ASSN.

This prize-winning export container packages 250-lb. precisely machined aircraft brake valued at $1,300.



New package for bearings is vacuum-formed acetate that carries protective oil bath for the bearing.

[5] See "Unit Packaged for the Assembly Line," MODERN PACKAGING, June, 1953, p. 126.

[6] See "Heavy Loads in Corrugated," MODERN PACKAGING, Oct., 1953, p. 125.

[7] See "Canned Parachutes," MODERN PACKAGING, July, 1953, p. 120.

[8] See "Pictorial Printing on Corrugated," MODERN PACKAGING, Aug., 1953, p. 98.

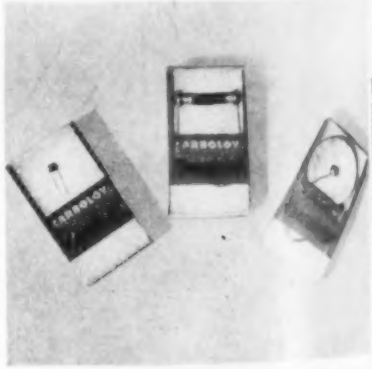


PHOTO COURTESY GENERAL ELECTRIC CO.

New materials such as this plastic-foam filler provide special protection for easily broken electronic parts.

Industrial Packaging Materials

Trends to new types of materials and containers in the industrial and shipping-packaging field usually are impelled by the never-ending search for economy. A lighter and less-expensive container that will do the protective job, or even a more costly container, if it will save sufficient shipping expense, is the constant objective in this field.

The most obvious trend is a continuing swing toward paper materials and paper containers, away from the heavier woods and metals. Greatly improved paper materials, incorporating such properties as wet strength and frequently combined with plastics and foils, make it possible.

The multiwall paper shipping sack and the fibre drum are now the standard packages for most dry, free-flowing industrial products. Paper bags are being made in enormous sizes and lengths to contain such products as furniture, bedding and even automobiles. Even lengths of lumber are now being packaged—wrapped in a special laminated, waterproof paper for outdoor storage, with printed identification.

Nowhere is the trend to fibre containers more apparent than in the produce field.[1] Between 70 and 80% of last year's lettuce crop was shipped in paperboard, as against only 20% in 1952. Some 80% of the 1954 lemon crop moved in corrugated "half boxes" with diphenyl anti-mold treatment, as against 20% two years before. In Florida, 70 to 80% of the grapefruit crop now ships in paperboard. Even bananas are now being shipped by Sunrise Fruit Co., Richmond, Va., in colorfully printed corrugated boxes.

As an example of what lighter-weight containers can mean to the furniture industry, the John B. Salterini Co., makers of wrought-iron furniture, cite a complete change-over from crating to the use of sealed corrugated containers which, studies showed, would result in savings to the customer, on an average freight run of 1,000 miles, as high as $11.

Nearly all types of household furnishings are being shipped in printed corrugated containers, including TV sets, rugs and refrigerators.

Specially engineered corrugated packings are taking over big jobs that only a short time ago it was thought could be handled only by wood crating. An interesting example is a three-bladed aircraft propeller assembly shipped by Hartzell Industries, Piqua, Ohio. Triangular telescoping tubes take care of the hub. Rectangular corrugated sections with die-cut slots are slipped over each of the blades to suspend them within cartons which finally cover each blade and are firmly bound to the triangular hub section with steel strapping. The fragile blades thus have a complete floating suspension and stresses, wherever they may be applied, are transferred back to the hub where packing strength and unit strength are greatest.

One of the most significant examples of the heavy-duty capabilities of the corrugated container may be found in its current widespread adoption in place of the traditional wooden keg for shipment of nails, nuts and bolts. One such box, a two-piece, full-telescoping construction, comes to the manufacturer as two flat sheets, cut and scored. One operator with a standard horizontal-arm wire stitcher can assemble 130 complete boxes per hour. When filled and bound with wire strapping, the container has three thicknesses of weather-resistant corrugated board on all sides and will easily handle a 100-lb load.

In the extreme upper range of shipping containers, there is continued interest in very large bulk containers which are, in effect, a way of fractionalizing the freight-car load and dividing bulk materials into batch lots which may be handled by lift trucks and monorail systems. Many large bakers receive their flour supplies this way, in giant fibreboard boxes.

One of the more unusual recent innovations is the Bakelite Co.'s adoption of large, collapsible containers, constructed of synthetic rubber and fabric like a four-ply automobile tire, for shipment of polyethylene resin to customers in 9,400-lb. lots. When loaded to their full 8-ft. height and 300-cu.-ft. capacity, five of the huge drums fill a railroad gondola car; emptied and collapsed, they take little space. When used with special mechanical handling equipment in the customer's plant, the containers are said to cut the transportation and handling cost of the resin by one-third cent per pound.

Protectionwise, the latest ingenuities of the industrial and shipping-package engineers extend over a very wide range. In addition to the old stand-bys of creped cellulose pads and wadding, shredded paper, animal hair and rubber, and ingeniously designed interior corrugated pads and braces, there is great interest currently in better, lighter and more resilient foamed materials, which can be molded or formed to the exact contours of a delicate product.

Newest of the foams is polyurethane, said to be the lightest and most resilient of all. There are phenolic foams, polystyrene foams, vinyl foams and a new type of polystyrene which expands in the mold to form a rigid, hard-surfaced, contoured container.[2]

Prize winners year after year in the Industrial Packaging Competition are "floating" suspension packs that protect fragile articles from shock in any direction. The principle has been interestingly applied to a small folding carton, using nothing but the carton board itself, in the automatically handled box used by General Electric Co. for its small radio, TV and other electronic tubes.[3]

Great progress is being made in long-term protection of small industrial items and precision parts. In military packaging a 10-year shelf life for all items is currently sought, whereas only a few years ago protection for 18 months was considered the optimum.

Vacuum-formed and heat-sealed plastics have come into play here. One recent method forms sheets of cellulose acetate into cups in which ball bearings are placed in an oil bath; when a corresponding sheet is electronically sealed over the top, the bearings are protected indefinitely against corrosion, yet are visible for identification and inspection.

The vacuum-sealed can and the properties of volatile corrosion inhibitors (VCI) are also being employed successfully in the protection of industrial items.

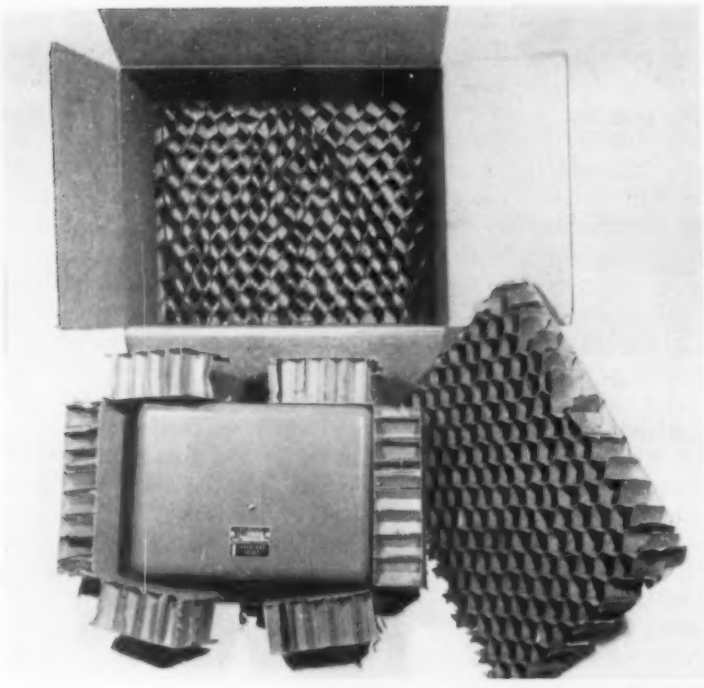
[1] See "Trend to Fibre for Produce," MODERN PACKAGING, Oct., 1953, p. 138.

[2] See "Foamed in the Mold," MODERN PACKAGING, Sept., 1955, p. 116.

[3] See "Suspension Tube Carton," MODERN PACKAGING, June, 1955, p. 118.

Engineering the industrial package

by B. W. ERIKSON*



PHOTOS COURTESY GENERAL ELECTRIC CO.



Neat, well-engineered honeycomb pack for delicate relay adds impression of careful workmanship and quality to product. In contrast with this, the unplanned, unscientific crumpled-paper packaging at right provides haphazard protection at best; adds nothing to product appearance.

Industrial packaging's basic chore is to deliver products to customers in as good condition as when they left the manufacturer. This is a rather simple purpose but one which today helps support a multibillion dollar field. Industrial packaging today is alive with new challenges and opportunities as a result of changing concepts and increasing knowledge.

For many years a type of narrow thinking prevailed in industrial-manufacturing areas which was not always conducive to progressive packaging activities. Packaging, with its related materials and labor, was considered a necessary evil and, generally, any possible improvements or accomplishments were ignored or considered unwarranted. Hence, it was difficult to have management show much interest or concern with such problems. The main point of the subject was almost constantly overlooked—potential cost reductions. Packaging responsibilities were usually delegated to a factory group of semi-skilled or unskilled employees with inadequate instructions or facilities. However, World War II, with its accompanying shortage of materials, forced management into broadening its concept of industrial packaging activities and awakened interest in a field which heretofore had unexplored monetary returns. A close look at such operations, however, revealed for many industries a lack of any effective program for carrying out or stimulating further improvements.

Management's approach became an analysis of a particular industry packaging problem. These were quite comprehensive and included studies pertaining to responsibility for and suitability of design, manufacturing costs, material-handling requirements and size and location of area for packaging operations. Packaging problems were being studied in a more scientific manner, although the theme was still aimed at protection of goods at the lowest possible unit cost.

In most cases management assigned the industrial packaging function to manufacturing as a definite adjunct to normal manufacturing practices with the individuals working through or from the shipping superintendent's office and responsible directly to him. This is undoubtedly the most common approach today. However, other manufacturers felt the best approach to be through their engineering sections. Where this type of organization prevailed, further additional progress was made by virtue of stimulating an interest on the part of industrial designers to consider the needs of packaging and safe delivery of goods to the ultimate customer at the time of the original conception of a design. This practice frequently leads to phenomenal progress in lowering over-all cost, size and packaging weight, and improving customer acceptance factors of a package.

In companies whose products involve extensive engineering, the most forward-looking approach to long-term accurate package design should almost always be a design-engineering function and included as part of engineering specifications and drawings at the time of the original product design. The engineer—with his fact-finding approach and his training in weighing and analyzing—has a decided advantage over the ordinary shipping-department or factory packaging man. There is also open to the engineer the additional avenue of product design change or modification. There is considerable value in this respect, for many times a fairly simple modification of the original product design can be made that will subsequently simplify the package and packaging materials required. For instance, a number of cases on record reveal a minor

* Engineering Section, Specialty Control Dept., General Electric Co., Waynesboro, Va.

change in some sheet-metal part or a molded-plastic part permits the device to stand more shock or be handled and packaged in a different manner. This, of course, leads to lower cost for the unit pack itself. It should be emphasized, therefore, that the "engineering" approach to a packaging problem offers an excellent starting point both for producing packaging ideas and selling them to management.

The normal elements a package designer should consider are numerous, and, of course, all factors would not apply to every industrial manufacturer's products. (See "Trends in Industrial Packaging," p. 662 and "Packaging the Ultra-Fragile Product," p. 668.) There are, however, basic approaches, some of which are as follows:

1. Modify the pack as it now exists by substituting less expensive parts or fewer parts, or modify the pack by a change in the device design itself.

2. Design the pack for either individual packaging or for multiple packaging and determine the type of material to be used, such as chipboard, corrugated, wood, etc., keeping in mind the least expensive at the lowest weight and lowest over-all unit cost.

3. Study pack design to determine whether design lends itself to complete assembly at one point in the manufacturing cycle or permits piecemeal assembly of the package.

4. Consult warehouse people, distributors, or other outlets to determine their degree of acceptance. If objections or complaints are common, undoubtedly an opportunity is available to accomplish a redesign job.

5. Determine whether or not packaging is to be done on a large- or small-volume basis and whether this justifies further improvements or effort.

6. Analyze how the package design fits in with other labor operations in the area and determine whether low labor spots would permit packaging to be done on a much less costly or cost-free basis. This is true of in-line operations where one operator is normally waiting for another, thereby having spare time.

7. Design for unit packaging to combine different components so ultimate customer receives a minimum number of packages for each order.

8. Explore the possibility of direct material substitution, where possibly a less expensive or less bulky material can replace the one in use. This aspect of the program must be a continuing activity as new materials are developed and introduced or price structures are modified.

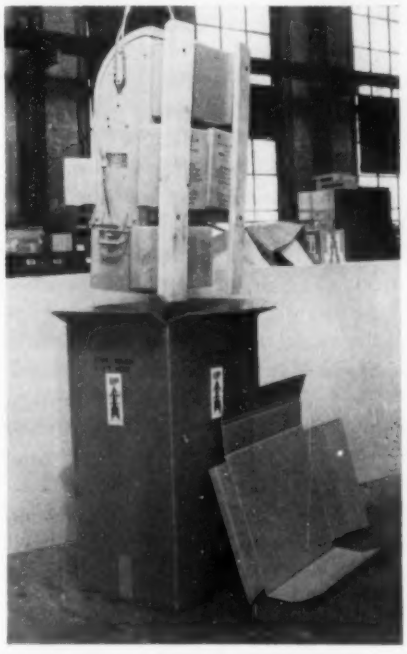
9. Design packages for adequate protection at lowest possible unit cost using standard test requirements.

Testing of Materials

The best designs and theory are not always the most practicable, and the subject of packaging and its related problem is no exception. There are several methods of determining the practicality of package designs and materials. The best test of a package or container is actual shipping. However, this approach is both slow and costly. For this reason laboratory testing and other scientific approaches are employed.

It is possible to make laboratory tests on a complete package and obtain a certain amount of information as to the carrying qualities of the whole. The revolving-drum test will subject the container to some of the shocks that may be expected in shipping. This test was at first widely accepted as a true guide to shipping hazards. However, further study led to the now generally accepted opinion that many identical tests are necessary to obtain sufficient data.

The drop test is a very desirable and widely used test for many shipping departments. This test permits any number of drops to be made in any desired position from an equally adjusted height. This type of test can be conducted with very little effort and low-cost equipment.



Maximum protection, compactness and ease of handling are here achieved for compensator package. Cartoned cans of oil help supply cushioning.

The incline plane test, a modification of the drop test, is one in which the container is placed on a dolly. The dolly slides down rails on an incline plane, having an angle of 10 deg., from any desired height, the box striking a rigid bumper at the end. The impact on the box correlates with the distance the dolly travels. The test is a convenient one to make, particularly on large heavy boxes, for the dolly can be pulled up the incline by a cable and winch and the shock to the container at the bottom can be closely observed.

Another popular test is the compression test where the content affords little support to the outer container and where a squashing effect of the interior contents seriously affect the sale of the commodity. This type of test is frequently used for products such as breakfast food, soap flakes and similar flaked or granular commodities packaged in cartons.

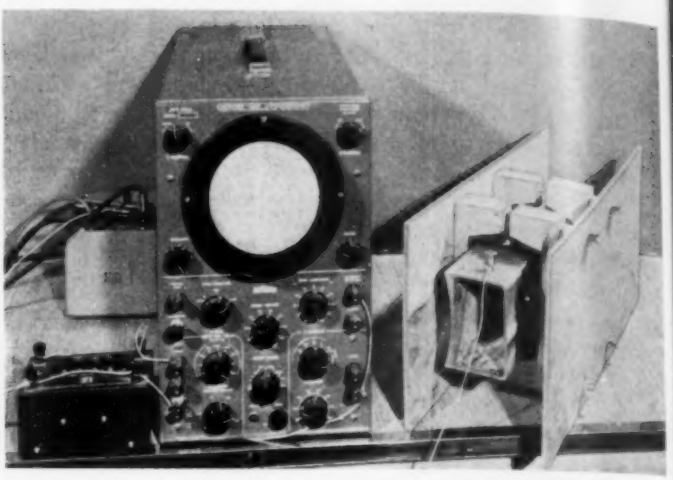
Vibration-testing machines were put into use during World War II and it appears probable that this type of test will continue. The apparatus consists basically of a table, the dimensions of which are sufficient to accommodate the largest container that will be tested. The table is caused to move vertically and horizontally by means of power-driven cams, imparting a two-way motion to the table top. The amplitude and frequency of the motion is usually adjustable to obtain varying degrees of severity of shock.

Material specifications

Many manufacturers requiring large-volume shipments endeavor to establish specifications for all materials purchased in quantity. Also, inventory control procedures are established accompanied by a program to effect standardization and cost reduction in the purchase of the volume-used items. The specifications are arrived at through frequent usage and as a result of the aforementioned tests. In many instances specifications are accompanied by properties sheets compiled by engineering for use by individuals who specify and purchase materials. These sheets, besides carrying the properties required by the specifications, present facts on the use and restrictions of the material.

PHOTOS COURTESY CARGO PACKERS, INC.





Oscillograph and accelerometer set-up, showing time calibrator for purpose of establishing a standard for shock frequency.

Three-foot drop test onto a concrete inlay is performed on each of container's six surfaces to prove that protection is adequate.

Packaging the ultra-fragile product

by JULIUS B. KUPERSMIT*

The age of the instrument—of nucleonics, electronics, miniaturization, automation, supersonic speeds and similar exciting frontiers—has brought about a growing field of specialization in packaging. This field is the packing, shipment and preservation of ultra-fragile products.

When such a product embarks upon its journey a multitude of things may mar its reliability. In the case of sensitive computers, electron tubes, communication and photographic instruments, or any of their component parts, the slightest change in reliability renders the product valueless. Field servicing and repair are costly and time consuming at best.

With growing emphasis on industrial automation and push-button military defense, it has become more imperative than ever that the gap between the manufacturer of a fragile product and its user be bridged.

Although many lessons were learned during the Korean War and World War II about the need for such a bridge to secure reliability of instrument performance, it has been only within the comparatively recent period of the last two years or so that packaging specialists began to approach the problem of ultra-protection on a truly scientific basis—that is, through research, compilation of performance statistics, analysis of data, and development of new principles and a field of specialized knowledge.

Use of special measuring and recording equipment, new testing machinery for controlled experimentation, different or newly developed cushioning and container materials, and chemical, metallurgical and engineering analysis are now beginning to produce the kind of bridge that is needed. This new scientific approach has already begun to produce results of such a startling and gratifying nature that reliability of performance can be almost 100% assured.

We now know that even the most complicated instrument will be ready to perform anywhere and anytime with laboratory reliability, if the problem of packaging it is given the same scientific study, analysis and experimentation that goes into assuring the quality of the product itself.

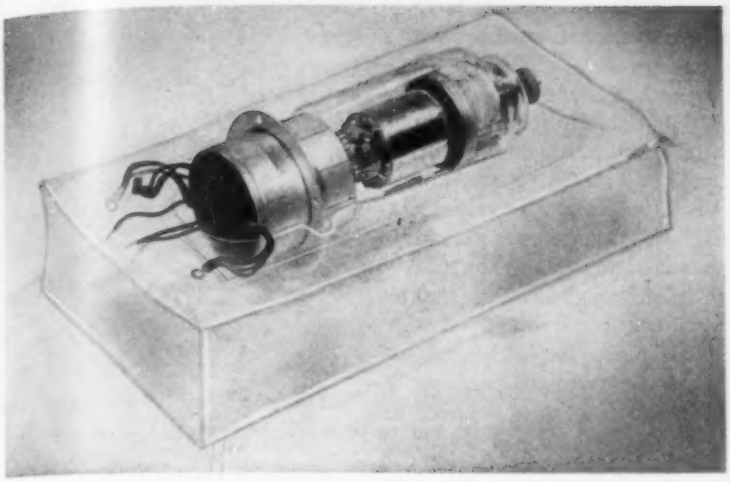
For example, molded animal hair and foam rubber are not neutral and they may react chemically with the product and damage it. Cold, too, may affect the properties of some cushioning materials and destroy their shock-absorbing quality. Cushioning containing moisture can set up corrosion and affect performance of equipment. The plating of component parts of instruments may become oxidized by noncompatible cushioning and thus affect their proper operation.

The earlier approach to packaging emphasized making containers as strong as possible. Today, we know that cushioning is the prime consideration. For it is the cushioning that supplies the critical protection. Then the shipping container choice is a generally routine matter depending for the most part on whether the distribution is by air, rail, motor or ship.

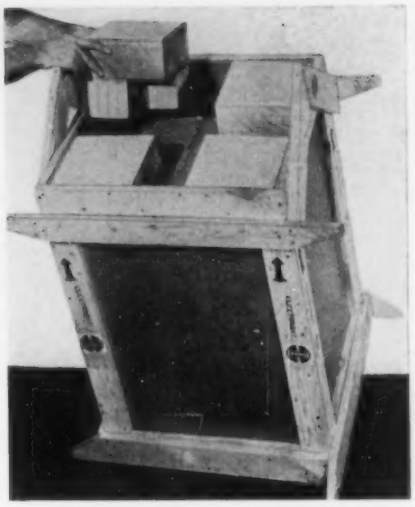
The fragility of an electronic item cannot be determined with the naked eye. Only scientific measurement can do this. With the rapid recent growth of electronics in industry and the Federal Government's increasing use of complex computing devices both for administrative and military purposes, the packaging field has been forced to develop along scientific lines.

Without accurate knowledge, the tendency would normally be to overcushion a fragile item and so waste materials and increase bulk and costs. We can now measure fragility—the

* President, Cargo Packers, Inc., New York.



Pneumatic package constructed of formed rigid vinyl cradle with flexible vinyl pouch. Air under pressure provides cushion.



Fibre-glass corner cushions protect electron tubes from shock.

maximum energy a product can absorb without destruction—through use of an accelerometer and a recording oscillograph. Once fragility is determined, we can ascertain the exact amount of cushioning necessary.

When a packaging problem is presented to the specialist in packaging ultra-fragile items, it goes first to the research and testing laboratory where a sample item gets a thorough construction analysis. Dummy samples may be carefully constructed and placed in a sample package and then tested for reaction to shock, vibration, heat, cold, moisture, contamination, crushing, piercing, abrasion and pilferage. In addition to the now standard climatic chambers and drop tests, the packaging specialist can use equipment adapted from other fields, including high-speed motion-picture photography, stroboscopic lighting and flash X ray. Various graphic recorders are generally used during these testing processes to tell what is happening inside the package. The results are then carefully analyzed before any final decision is made as to type or design of cushioning or container.

To illustrate, here is the procedure followed in developing a package for a 5586 magnetron, the vital element of a radar installation. Basically the magnetron is constructed in the shape of a right triangle. The vertical portion is a glass tube containing an ultra-fragile component. The horizontal section is of heavy, silver-plated metal and it supports a delicate tuning mechanism.

The problems were sixfold:

1. To find a cushioning material that would not oxidize silver plating.
2. To find some means of cushioning that would prevent any destructive "whipping" action caused by the unbalanced shape and weight of the two sections.
3. To keep the package as light as possible.
4. To restrict its bulk to as small a volume as possible, within the limits feasible for a magnetron.
5. To create a package that would allow easy handling after leaving the production line and prevent any intraplant damage.
6. To use cushioning and container materials that would always be readily available, even in an emergency.

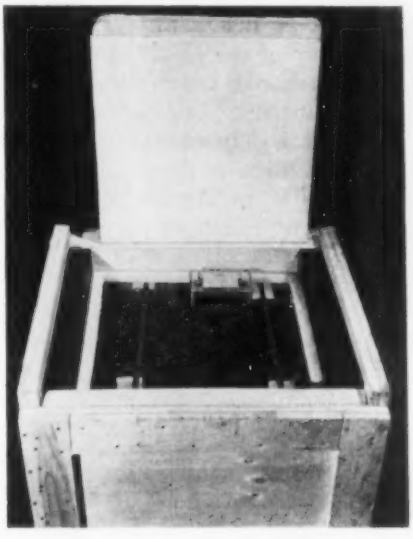
Because a single mass object with a large surface area would correct any unbalance and eliminate any whipping action, it was decided to square off the magnetron and form a "cube."

Although inexpensive, animal-hair cushioning was desirable, it would exert a corrosive influence on the product. It also would not prevent the whipping action of the tube from causing damage. Therefore, to be able to use this material, it was decided to provide an inner cushioning of inert, blown foam polystyrene around the magnetron. This successfully isolated the product from the animal hair without adding weight or bulk, since the foam plastic is almost as light as air and can be used in minimum thicknesses.

The amount of additional cushioning of molded, rubberized animal hair needed around the entire cubed magnetron was mathematically deter-



Hair and plastic foam pack creates cubic mass for 5586 magnetron.



Device in free-fall, air-drop package records shock of impact.



Blown polystyrene foam squares off irregular mass for packing.

mined, using appropriate physical formulas, and the package placed in an ordinary corrugated paper carton. The protective performance of the entire packaging project was calculated to sustain a 4-ft. drop.

The next step in the project—of equal importance in facilitating production of the package—was the study of the construction of the package to determine how to separate its various parts so that they could be most easily and efficiently assembled.

In testing the package, an accelerometer of the barium-titanate type was placed onto the electron tube and a lead brought out from the accelerometer through holes in the cushioning and the outer container to a recording oscillograph. The package was dropped on all six faces and each shock wave was recorded.

Prior to each recording, a frequency standard was photographed on each film so that the shock wave could be calibrated against the standard. Thus, it could be determined whether the frequency of the shock wave or any of its harmonics were resonant to any of the magnetron's delicate components. It is important to emphasize this fact that, although shock may not destroy an electron tube itself, sympathetic vibrations may destroy a component and be just as damaging as smashing the entire tube.

A translation of shock waves shows how much energy is being absorbed by the cushioning and how much is being transferred to the electron tube. In the tests on the magnetrons, it was found that the cushioning thickness could be reduced substantially to produce a light, economical package yet affording necessary safety margins.

The rigid, blown polystyrene foam used as cushioning was found to have a very significant characteristic. This material—used widely in Christmas decorations and in home insulation—was found particularly effective in tests of extreme shock. It acted exactly as a safety fuse does in the event of an electric short circuit, because it absorbed almost all the impact energy without passing any along to the product. And although its recovery ratio is practically non-existent, eliminating the cushioning for further use, the foamed plastic saves the product. Like the electric fuse, this type of cushioning can be replaced at small cost and is generally used as secondary protection in conjunction with cushioning having a more normal recovery action.

Cushioning materials

The packaging engineer has a wide range of materials and devices from which to choose. Some of the important cushioning materials are described in the accompanying chart "Properties of Cushioning Materials." The chart is based on excerpts from current published data. The properties include:

Compression set. This is the capacity or property of a material to return to its original thickness after being compressed under a standard load for a given time. This has significance in determining whether a cushioned item can remain in storage for an extended period without causing the cushion to give permanently. Permanent set is undesirable when it creates free-moving space in the container that may lead to damage of the packaged item.



Specialized equipment is required. This press die-cuts form-fitting pad of laminated rubberized hair.



Plastic pack gives protection and visibility to rubber "O" rings.

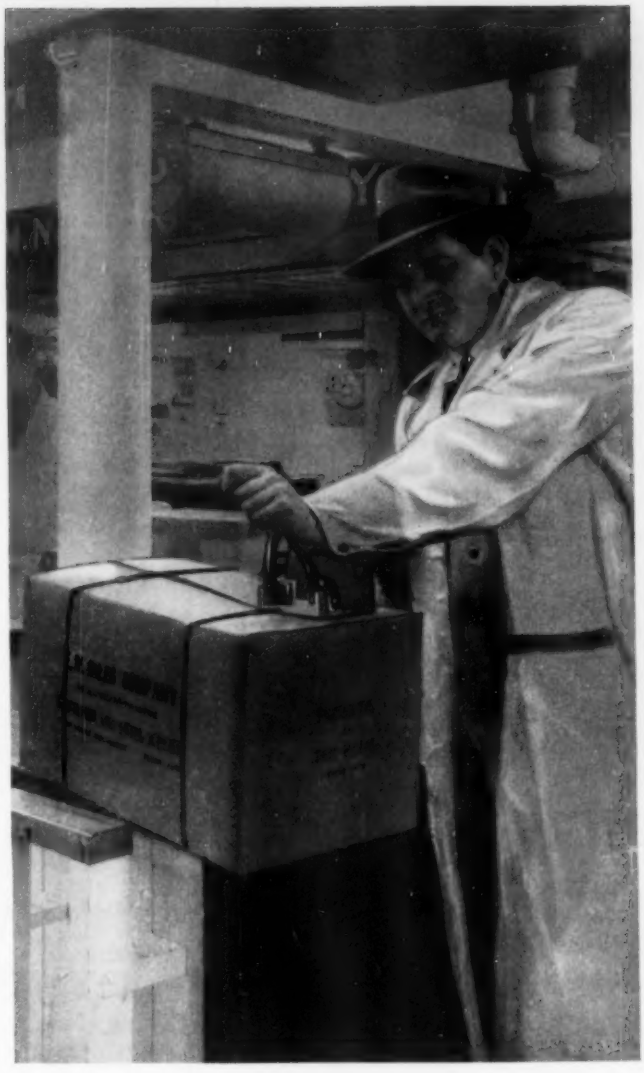
Damping. This is the unreturnable portion of the energy-absorbing property of a cushion. A very soft material gives excellent damping performance because it dampens or smothers any impact shock. Popcorn, vermiculite, cellulose wadding and similar materials do a good job of absorbing a punch and their damping properties are therefore considered excellent. A spring, on the other hand, tends to transmit shock or impact with little diminution and is therefore said to exhibit poor damping properties.

Density. This represents the weight of the cushioning material per unit volume, normally expressed in pounds per cubic foot. It indicates the amount of weight added to a package for a given volume. An inflatable cushion, for example, adds very little weight in relation to cube, for it is almost all air. Molded foam rubber, by way of contrast, is a "heavy" material and its density is rated as "high."

Dusting. Materials such as excelsior, popcorn, shredded paper and the like not only tend to be messy during packing and unpacking, but they also give off small particles that may work themselves into crevices and critical working surfaces of the part that is packaged. This characteristic of a cushioning material—the presence of minute particles—is known as dusting.

General corrosive effect. Some materials react with the part to be packaged and induce corrosion. Where products with critical metal surfaces are to be packaged it is necessary to take this characteristic into account and either select noncorrosive materials or else shield the product from

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PROPERTIES OF SELECTED CUSHIONING MATERIALS*

Material	*Compression set*	*Damping*	*Density*	*Dusting*	*General corrosive effect*	*Moisture absorption*	*Moisture content*	*Fungus resistance*	*Low-temperature performance*
Sheet Animal Hair —Bonded Rubber	Slight	Fair	Average	Slight	Slight	Slight	Low	Must be treated	Good
Molded Animal Hair —Bonded Rubber	Slight	Fair	Average	Slight	Slight	Slight	High	Poor	Poor
Foam Rubber, Molded	Slight	Fair	High	Much	Slight	Much	High	Poor	Poor
Blown Vinyl Flexible Foam	Much	Good	High	None	Slight	Much	Low	Good	Poor
Blown Vinyl Flexible Sponges	Much	Good	High	None	None	None	Low	Good	Good
Inflatable Cushion With Formed Vinyl Cradles	None	Fair	Low	None	None	None	None	Excellent	Good
Formed Vinyl Cradles In Suspension	None	Fair	Low	None	None	None	None	Excellent	Good
Springs	None	Poor	Not applicable	None	None	None	None	Excellent	Good
Canvas Slings	None	Fair	Not applicable	None	None	None	None	Must be treated	Good
Honeycomb Kraft Paper	Almost complete	Excellent	Low	None	Slight	Negligible	Low	Must be treated	Good
Excelsior	Much	Excellent	Average	Very high	Much	High	High	Poor	Poor
Shredded Paper	Much	Excellent	Average	Very high	Much	High	Low	Poor	Good
Foam Resins[1]	Almost complete	Excellent	Low	Very high	None	Slight	Low	Good	Good
Cellulose Wadding	Much	Excellent	Average	Much	None	Slight	Low	Poor	Good
Cotton	Much	Excellent	Low	Much	None	Much	Low	Poor	Good
Plant Fibres With Bonded Rubber	Slight	Fair	Average	Slight	Slight	Slight	Low	Must be treated	Good
Fibre Glass	Slight	Fair	Average	Slight	Slight	Slight	Low	Good	Good

* A more complete list of cushioning materials, classified according to types, appears on p. 655.
[1] Polystyrene, phenolics, etc.

contact with the material by means of a polyethylene bag or similar liner.

Moisture absorption. This is the capacity of the cushioning material to soak up water vapor from its environment. This moisture may in turn be transferred to the product with injurious effects.

Moisture content. Materials with high moisture content can transmit this moisture to the product packaged and this must be taken into account.

Fungus resistance. This is the property of a material to resist the development of mold, mildew or similar plant growths. Materials that permit the growth of a fungus can be treated to inhibit the growth.

Low-temperature performance. Materials that tend to become stiff and brittle at low temperatures lose their cushioning property. High-altitude air transport and shipment to arctic regions make this an important factor.

It will be noted that the materials listed in the properties chart provide differing characteristics and the use of any material by itself or in combination with other materials is determined by the type of protection sought. The ratings given are based fundamentally on testing under static, rather than dynamic conditions. Testing under dynamic, actual, load conditions would show considerable differences. In addition protection against moisture, corrosion and additional factors must be considered.[1]

New developments

Stepped-up engineering, chemical and packaging research and experimentation are now opening up en-

[1] See p. 654. "Protective Packaging Materials,"

tirely new possibilities in the choice of cushioning materials. For example, form-fitting plastic shells with flexible fins to absorb shock were recently introduced and are now being used for the first time in the field of low-density, transparent cushioning to study more efficiently the effects on products during their shock phase.

Another example is the vacuum-formed sheet-plastic package developed for bearings and other precision metal pieces. This type of package protects against the corrosive action of human hands and exposure to the elements, yet it is fully visible for inspection purposes without necessitating opening the package and exposing the product. With an impulse or high-frequency sealer, bearings can be packaged at a rate of 1,800 or more an hour.

Despite all these recent great advances in the direction of scientifically engineered packaging, we are relatively at the threshold of this vital field. New scientific discoveries will continue to widen our knowledge of materials and new packaging experimentation will enable us to make optimum use of these materials.

We expect the new electronic age to offer greater and greater challenges to our ingenuity in the future, but we are now prepared for these challenges —with the aid of research, engineering and widening experience.



Laminated, die-cut rubberized hair package for a radar training device is strong, form fitting, shock resistant and light in weight.



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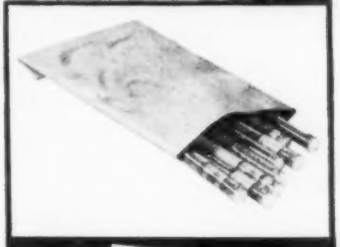
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Military packaging

by CLINTON K. ROYCE*

The past year has seen some important changes in military packaging. Most of these, however, have to do with policy, organization and techniques. There have been no fundamental changes in basic protective packaging requirements. How effectively some of the "new approach" which the Dept. of Defense has inaugurated will work out in practice only time will tell.

There has been a general "reshuffling" of packaging material and container-specification custodianship. For example, the Army has been assigned responsibility for future specification development coverng bags and metal containers. Responsibility for similar development covering packaging materials (which includes barriers, cushioning materials, etc.) has been assigned to the Air Force. The Navy is to be responsible for specifications for wood and fibre boxes.

If you have problems concerning specification requirements in any of these areas, take them up with the service indicated. Correspondence concerning bags and metal containers should be addressed to the Office of the Deputy Chief of Staff for Logistics, Dept. of the Army, Pentagon, Washington 25, D. C. Correspondence concerning specification matters involving wood or fibre boxes should be addressed to the Office of Naval Material, Dept. of the Navy, Washington 25, D. C. Correspondence regarding specifications for packaging materials (barriers, cushioning material, etc.) should be addressed to Headquarters, United States Air Force, Pentagon, Washington 25, D. C.

In addition to the assignment of these major areas of responsibility, there have been several assignments of minor areas. For example, reels and spools have been assigned to the Navy; the Army has been assigned ammunition boxes, and glass containers have been assigned to the Armed Services Medical Procurement Agency, 84 Sands St., Brooklyn, N. Y.

During the past year there has been a marked change in the attitude of the military services concerning industry cooperation, however. It has been noted at packaging shows and in joint military-industry packaging discussions that the services are more inclined to acquaint industry with some of the more important problems and industry has been quick to accept the challenge of military people.

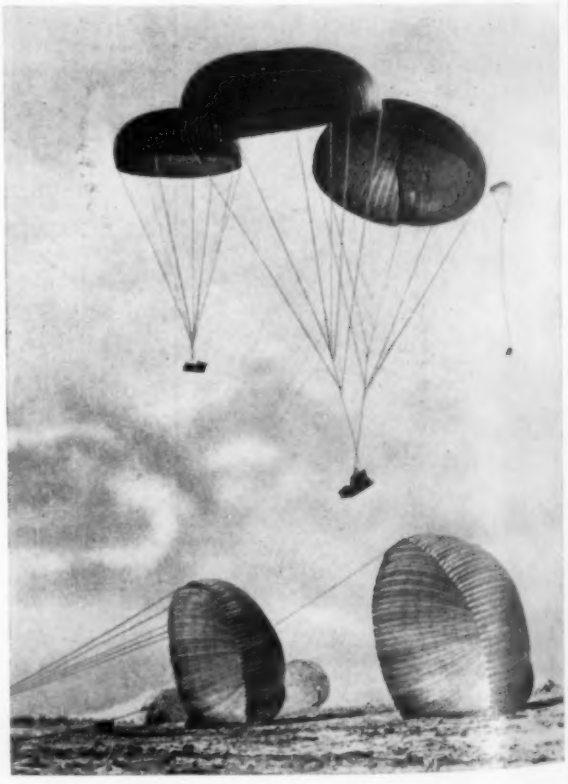
Perhaps the biggest single headache to military packaging people is the contractor who fails to familiarize himself thoroughly with the packaging requirements of his contract before accepting it. This is a subject on which volumes have been written and thousands of words uttered, but the contractor who fails to "read the fine print" is still a source of irritation to Government packaging administrators.

Even the most experienced of industrial people can get into difficulty quickly, so be certain of your position before proceeding in any matter where military preservation and packaging requirements are involved. Be sure to read every word in your contract—then re-read it carefully—know exactly what your responsibilities are before you sign. If everything is not clearly understood, or any point seems controversial as to interpretation, then be sure that these potential areas of difficulty are cleared up before you commit your company.

Most military contracts call for a degree of initial cleaning and preservation and of unit packaging not normally encountered or required in industry, so look carefully at these special requirements and understand exactly what you are obligating your company to do.

It is important that several basic Government packaging manuals, standards and specifications be in the hands of contractors doing business with the military services—these are available from various sources. The joint military services' packaging manual titled, "Preservation, Packaging and Packing of Military Supplies and Equipment," is available from the Supt. of Documents, U. S. Government Ptg. Office, Washington 25, D. C. at $1.75 per copy and should be identified by one of the three service numbers assigned to it (Army-TM 38-230, Navy-NAVEXOS P-938, Air Force-AFM 71-1).

Also available from the same source at 35 cents per copy is the "Military



Air-drop method at present requires large and expensive parachutes. Packaging research is centered on finding inexpensive cushioning materials that will withstand harder falls, eliminating parachute delivery.

* Publisher, "The Royce Packaging Letter," Milwaukee, Wisc.

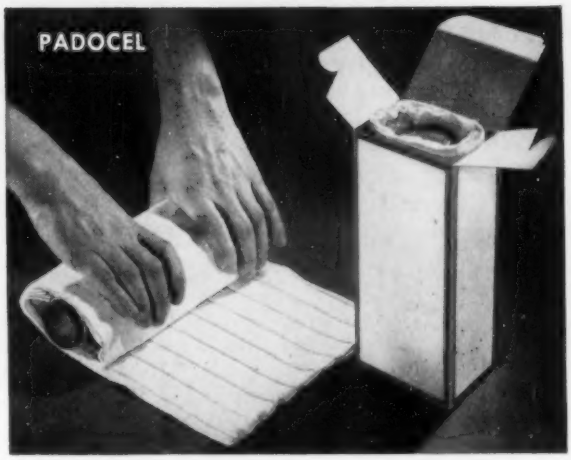
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282-286 PORTLAND ST. CAMBRIDGE, MASS.

Standard for Marking of Shipments" identified as MIL-STD-129. Military Specification MIL-P-116 covers "Methods of Preservation" and a copy of the issue currently in effect may be obtained (along with other pertinent military specifications covering packaging materials and methods) from the procuring agency or as directed by your contracting officer.

Copies of Federal packaging specifications may be obtained for a few cents each from General Services Administration, Business Service Center, Region 3, 7th and D Sts., S. W., Washington 25, D. C. Always be certain in applying specification packaging techniques and materials that you are working with the latest issue unless your contract specifically refers to a dated copy.

Work closely and cooperatively with your contracting officer and with your service inspector—these people can be most helpful. And remember, they didn't establish the levels of protection required by your contract. They are simply in the picture to administer that contract.

There seems to be a tendency on the part of more and more technical Army services and Navy bureaus to get away from packaging techniques employing a multiplicity of wraps and dips in favor of packaging materials like strippable cellulose acetate butyrate, vapor corrosion inhibitors, and metal and fibre cans.

Military packing people, in cooperation with their counterparts in industry, have developed positive means for satisfactorily sealing slip-cover cans. Industry has developed cooperatively with the military services special-purpose container boards that far surpass in performance such World War II "miracles" as V board. Industry, with military encouragement, has developed new techniques for reinforcing fibreboard with glass fibres.

Currently the Navy's Research and Development Facility at Bayonne, N. J., is making a study of container sizes in relation to pallet patterns in an attempt to develop new pallet pattern selection criteria for use in connection with the standard 40-by-48-in. pallets. Possible annual savings to the Navy of more than $5 million are indicated.

The conservation of weight and cube throughout all the services continues to receive high priority—and it should. Savings of many millions of dollars to American taxpayers each year will result if a conscientious pursuit of this present program is maintained consistently.

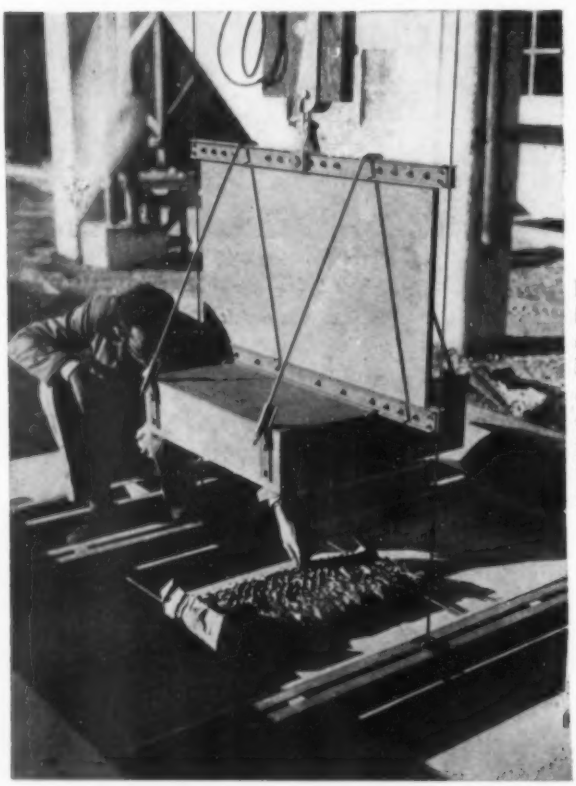
Packaging people in key positions in Washington are being sent into remote areas to make "on-the-spot" observations of transport, storage and handling conditions and their effect on military stores packed under existent specifications. Special military packaging teams made trips during the past year to Alaska, Korea, Japan, Europe and the Mediterranean area for the purpose of making these observations. Selected technicians from industry were given many opportunities to study military transport, storage and handling methods both in the United States and in the many military installations now being maintained abroad.

Of major importance is the packaging and shipping of large guided missiles. It is a well-established fact that faulty packaging can make ineffective the most reliable of missiles.[1] The Navy's Bureau of Ordnance has developed an alignment chart called a nomogram, which enables a packaging engineer to select a cushioning material best suited to the product or item being packaged; this important advance in the science of package cushioning will do much to eliminate many of the complicated problems encountered in designing packs for fragile or delicate items.[2]

Considerable emphasis is being put on aerial supply and resupply of ground troops in forward areas. New techniques, whereby the use of parachutes is being eliminated, call for a whole new packaging approach. The Quartermaster Corps of the Army is coordinating all the service studies relating to the problem of finding materials adequate for expanded aerial delivery of supplies[3].

The Ordnance Corps of the Army has placed in operation, in connection with the Ordnance Packaging Office at Rossford Ordnance Depot near Toledo, Ohio, one of the largest and most complete laboratories in the country for making performance tests both on containers and on packaging materials.

There appears to be a great deal of highly qualified talent at work on the many facets of military packaging. Some of these people have established good two-way communication with industry, but the need for top-level, thorough coordination of both military and industrial packaging interests is still with us.



Results of an impact test involving the energy-absorbing properties of a honeycomb paper material are studied by a research engineer. Tomorrow's improved military packaging will be based on technology now in the making.

[1] See "Packages for Guided Missiles," Modern Packaging, May, 1955, p. 129.
[2] See "A Package Cushioning Nomogram," Modern Packaging, Aug., 1954, p. 124.
[3] See "QMC's Challenge to Packaging," Modern Packaging, July, 1955, p. 104.

Shipping regulations

Complying with the various shipping regulations and recommendations set forth by Government agencies and official carrier groups is a complex problem. Requirements differ not only among commodities and package types, but also among various carriers.

The only time the Government steps in to tell you what to do regardless of the carrier you choose is when your product is considered hazardous in transit. The packing of dangerous commodities shipped by rail, water or truck comes under the control of the Interstate Commerce Commission, which has been authorized by an Act of Congress and utilizes the services of the Bureau of Explosives (Association of American Railroads) in carrying out the Act. Requirements that must be complied with in shipping merchandise defined in this classification include the use of certain labels, container markings and detailed container specifications.

The regulations of the ICC are contained in the *Code of Federal Regulations, Title 49—Transportation Parts 71-78* (U. S. Govt. Printing Office, Washington, D. C.). The Tariff Code and all supplements for a three-year period are also available from the Bureau of Explosives, 30 Vesey St., New York 7, as *H. A. Campbell's Freight Tariff No. 9*. Part 77 of the above code covers shipments by truck. Further information on truck regulations is found in the *Motor Carriers Dangerous Articles Tariff* issued by the American Trucking Associations, Inc., 1424 Sixteenth St., NW, Washington 6, D.C. When shipped by air express or air freight, dangerous commodities come under the jurisdiction of the Civil Aeronautics Authority, which closely follows ICC regulations and issues its rulings in a separate publication, *Part 49—Transportation of Explosives and Other Dangerous Articles*, obtainable from the Govt. Printing Office at Washington or from Air Cargo, Inc., National Airport, Washington, 1, D.C., which issues them in tariff form available as *Official Air Transport Restricted Articles Tariff No. 6, Emery F. Johnson, Agent*.

Shipments by railroad freight come within the provisions of the Official Classification Committee, 1 Park Ave., New York, which represents some 950 rail and steamship lines. The committee has issued two sets of regulations, the *Consolidated Freight Classification* and the more recent *Uniform Freight Classification* which together cover railroad shipping regulations for the whole country. The latter itemizes some 10,000 commodities, giving the types of containers that can be used, container specifications, any special markings required and other essential instructions. Rule 5 is the penalty section and Rule 40 covers all containers except fibreboard containers, which are covered in Rule 41.

Motor transport is subject to two classifications. The principal one, applying in 42 states, Hawaii and other U.S. possessions, is the *National Motor Freight Classification* distributed by the American Trucking Associations. The National Classification Board, which issues these instructions, represents nearly 6,000 participating motor carriers. A separate classification covers part of New England.

Parcel Post specifications are more difficult to get at. The Post Office does not issue packing instructions in any one compendium, although there is a Classification Department at the New York City G.P.O. and the U.S. Postal Regulations may be helpful. Pamphlets on special subjects are obtainable at all post offices. If still in doubt after consulting all printed matter, submit your proposed package to the local postmaster for approval.

For shipments by Railway Express, the *Official Express Classification* can be secured on application to the agency at 219 E. 42nd St., New York. This classification covers the packing and shipment of all kinds of products in specified containers via carriers employed by the agency.

To date neither Government nor the airlines have consolidated a single body of regulations or recommendations that can be referred to by the would-be user of air freight as a guide. However, complete packing and shipping recommendations will be furnished on request of the Shippers' Information Bureau, Air Cargo, Inc.

In packing for shipment by waterway freight, the same situation prevails. There is no one reference work which covers all carriers and all products. Intercoastal shipments (between the Atlantic and Pacific via the Panama Canal) are partly covered by the *Western Freight Classification* of the AARR. For details, write the Intercoastal Steamship Freight Association at 80 Broad St., New York. Coastwise shipments in general follow intercoastal practice. Inland water transport is guided by the barge companies, most of them members of the National Water Carriers Association, Southern Building, Washington, D.C.

Fresh fruits and vegetables are packed and shipped under certain rules initiated through the National Container Committee, 59 E. Van Buren St., Chicago 5, and actual specifications are published as follows: for the Southeastern states in *Southern Freight Tariff Bureau, Tariff 823 Series* distributed by C. A. Spaninger, Agent, 101 Marietta St., Atlanta, Ga.; for the Pacific Coast (*Tariff 1 Series*), the Central West and Southwest (*Tariff 2 Series*), and the Northeast (*Tariff 4 Series*), all distributed by Agent D. T. Jamison, 516 W. Jackson Blvd., Chicago. The Freight Loading and Container Bureau of the AARR also publishes packing, container and carloading information for selected commodities which can be obtained on request of the Secretary at 59 E. Van Buren St.

Several Classification Committees (in Rule 49 of the *Consolidated Freight Classification*) have spelled out procedures for making test shipments of many commodities. Rule 33 of the *National Motor Freight Classification* does the same thing for shipments by motor carrier. In general, the carriers are all cooperative on the question of test shipments for new containers or package components and should be consulted about them.

The simplest way to be sure your product is being packed legally, safely and economically is to have on hand all the basic references which apply to the commodity you manufacture, the type of container you are shipping it in and the kind of carrier that will be shipping the commodity for your company.

Materials-handling equipment

One of the oldest, most useful devices expediting the movement of goods is the wheel and axle. For lighter loads and short hauls, where manpower alone is available or desired, or where powered equipment must be supplemented, the wheeled implement has immense value. Some of the principal types of wheeled devices include:

One-wheeled trucks, wheelbarrows

Two-wheeled, hand, stevedore or warehouse trucks

Castered dollies and racks

Four-wheeled platform trucks—four sided, three sided, shelf type, balance type, wagon type, trailer type, nontilting, etc.

The chief advantage of hand-powered vehicles is the fact that they lend themselves to small flexible operations and can be used in limited areas. Capital investment and upkeep are low.

Powered trucks

Power units for materials-handling trucks are of three types: gasoline motor, electric motor and battery and gas-electric combination. The gas motor is said to involve lower initial cost, but higher upkeep and operating cost, while just the reverse is true of electric trucks. Each type has its performance "bests" for specific requirements. In some instances the gas-operated truck must be eliminated from consideration because of sparking or fumes. Special "sparkproofing" must be incorporated in an electric fork-lift truck, at additional cost, before it can operate in an area where sparks are dangerous. The type of wheel or tire will depend on ground surface and various other factors, including such items as maneuverability, load cushioning, load stability, durability, etc.

Powered trucks are available in operator-walk and driver-ride models. The former are smaller in size, operate well in areas that might be too narrow for driver-ride trucks, handle lighter loads, may be used as the chief carrier or as valuable auxiliaries depending on the plant's physical characteristics and the requirements for the job.

Powered trucks used include:

Low-lift platform truck and high-lift platform truck

Nonelevating powered platform truck

Hand-guided pallet jack

Industrial tractors for drawing trailer trucks and trailer trains

Fork trucks for use with pallets

Fork trucks are used with many special attachments—grabs, clamps, scoops, cranes, push-pull devices, rams, turning carriages, etc.

The equipment listed is available in many makes, types and sizes. Practical selection of any model depends on the over-all materials-handling plan; the physical characteristics of the plant (floor, area, number of stories, elevators, sizes of doors, ramps); nature of the product handled; production cycle, volume and seasonal fluctuations; inventory; safety; working conditions; and, finally, the performance characteristics, capacity and economy of the equipment.

Fork trucks are available in rated capacities beginning at 1,000 lbs. The usual range is under 10,000 lbs., but higher capacities can be had. Ratings are based on the load which the truck will carry safely on a hard, smooth surface. Ratings are usually calculated in pounds carried at a stated distance in inches measured from the vertical face of the forks to the load's center of gravity. The object of such a rating is to establish a safe, nontip operating ratio. Ratings are usually set at about three-fourths of nontip capacity to provide a safety margin. This is a necessary precaution, since grade, surface, forward speed, braking speed, mast height and pallet size affect the counterbalance principle on which the work truck operates.

Pallets

The pallet most commonly used has two parallel horizontal surfaces providing an in-between space for the insertion of lifting forks. The two types of pallets in general use are storage pallets and shipping pallets. The latter may be returnable or expendable. Both storage and shipping types overlap in use. Materials from which pallets are made include wood, aluminum, steel, magnesium, plywood, presswood, fibreboard, corrugated board and paper. Wooden pallets vary in weight up to more than 100 lbs. Oak or other hardwoods are generally used for warehouse and storage pallets; softwoods go into the various lighter types of pallets.

In handling some products on wood pallets, it may be desirable to treat the pallets to repel moisture and the micro-organisms that cause decay, mildew and unsanitary conditions. This is especially important in the handling of certain foodstuffs. Treatment of the pallet in such instances must be nontoxic, tasteless, odorless, possess minimum staining properties and be easy and safe to apply. Commercial compounds have been developed to fulfill these requirements.

A major problem in the use of pallets for shipment is the question of freight rates (both going and return), or cost of the pallet if it is expendable. Pallets made from lightweight materials and sufficiently inexpensive to be used one way and discarded have enjoyed popular acceptance by many shippers.

Pallet loads may be glued or strapped together for shipment as a unit and exterior protection or waterproofing may be wanted, depending on exposure risks, rough handling and other factors, which, incidentally, are more apt to occur in export shipment than in domestic handling. Today's trend appears to be toward the unit load—on pallets or on other special devices.

There is a need for standardization of pallet sizes to permit wider shipping utility, more extensive use of expendable pallets, development of pallet exchange plans and reduction in the cost of the pallets themselves.

On the other hand, there is a growing need for manufacturers to design packages that are suited for standard-sized pallets. Some road blocks stand in the way of this development. For example, packages sized for convenient storage and shipment by the manufacturer, may not be convenient for the wholesaler, forcing him to overstock or to handle open-case lots, or calling for equipment he does not have. Standardization is an extremely complex process, and handling must be geared to the program all along the line if it is to be made completely effective.



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The data herein are compiled from information furnished by the Companies referred to and the publisher, its officers, employees and agents do not represent and/or guarantee the accuracy of said data and listings and/or the right to the use of the trade names as listed herein and do not accept any responsibility in connection therewith. Said data, etc., are included as a service only.

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Materials and Supplies Section

ADHESIVES*

For editorial information, see Section 5

Adhesive Products, Inc., Albany, Calif.
Advance Coatings Co., Westminster, Mass.
American Products Mfg. Co., New Orleans, La.
American Resinous Chemicals Corp., Peabody, Mass.
Angier Products, Inc., Cambridge, Mass.
•Arabol Mfg. Co., New York
Armour & Co., Chicago
•Armstrong Cork Co., Lancaster, Pa.
Babbitt Chemical Co., New Bedford, Mass.
•Bakelite Co., Div. Union Carbide & Carbon Corp., New York
Barrett Div., Allied Chemical & Dye Corp., New York
Bartlett, F. P., & Co., Cambridge, Mass.
Bauer & Black, Div. Kendall Co., Chicago
Belding Corticelli Industries, New York
•Boler Petroleum Co., Philadelphia
Bond Adhesives Co., Brooklyn, N. Y.
Clark Stek-O Corp., Rochester, N. Y.
Cochrane Chemical Co., Matawan, N. J.
Commercial Paste Co., Columbus, Ohio
Corn Belt Adhesives, Council Bluffs, Iowa
Dennis Chemical Co., St. Louis, Mo.
•Dewey & Almy Chemical Co., Div. W. R. Grace & Co., Cambridge, Mass.
Dow Corning Corp., Midland, Mich.
•du Pont de Nemours, E. I., & Co., Wilmington, Del.
Electro-Technical Products, Div. Sun Chemical Corp., Nutley, N. J.
•Federal Adhesives Corp., Brooklyn, N. Y.
Findley, F. G., Co., Milwaukee
Firestone Tire & Rubber Co., Plastics Div., Pottstown, Pa.
Flintkote Co., New York
Fuller, H. B., Co., St. Paul, Minn.
•Goodyear Tire & Rubber Co., Akron, Ohio
Imperial Adhesives Co., Brooklyn, N. Y.
Imperial Chemical Industries Ltd., Plastics Div., Welwyn Garden, Herts., England
Java Latex & Chemical Corp., New York
Jones-Dabney Co., Newark, N. J.
Koppers Co., Pittsburgh
Manhattan Paste & Glue Co., Brooklyn, N. Y.
Merchants Chemical Co., So. Norwalk, Conn.
Midland Adhesive & Chemical Corp., Ferndale, Mich.
Minnesota Mining & Mfg. Co., St. Paul, Minn.
Mystik Adhesive Products, Chicago
National Adhesives (Canada) Ltd., Toronto, Ont.
National Adhesives, Div. National Starch Products, Inc., New York
National Casein Co., Chicago
Naugatuck Chemical Div., United States Rubber Co., Naugatuck, Conn.
Nicol, Malcolm, & Co., Hawthorne, N. J.
Northern Adhesives, Inc., Brooklyn, N. Y.
Old Empire, Inc., Newark, N. J.
•Paisley Products, Inc., Div. Morningstar, Nicol, Inc., New York
Paper Chemicals, Inc., Jamaica, N. Y.
Permacel Tape Corp., New Brunswick, N. J.
Philadelphia Quartz Co., Philadelphia
Phoenix Products Co., Milwaukee
Polymer Industries, Inc., Springdale, Conn.
•Pyroxylin Products, Inc., Chicago
Raffi & Swanson, Inc., Wilmington, Mass.
Randolph Products Co., Carlstadt, N. J.
•Reslac Chemicals, Inc., Chicago
Rubba, Inc., New York
•Rubber & Asbestos Corp., Bloomfield, N. J.
Schwartz Chemical Co., New York
Stein, Hall & Co., New York
Swift & Co., Chicago
Testworth Laboratories, Inc., Addison, Ill.
Time Saving Specialties, Minneapolis
United States Plywood Corp., New York
Watson-Standard Co., Pittsburgh
Williamson Adhesives, Inc., Skokie, Ill.
Wilross Products Co., Hawthorne, N. J.
Zophar Mills, Inc., Brooklyn, N. Y.

* Adhesives are usually formulated for specialized applications. This is particularly true of the newer resinous adhesives. The user should consult his supplier and give full information as to requirements and conditions of use.

AEROSOL PROPELLANTS

(See Propellants, Aerosol)

AEROSOL VALVES

(See Valves, Aerosol)

APPLICATOR CLOSURES

(See Closures, Applicator)

BAG TIES

For editorial information, see Section 7

•Acme Steel Co., Chicago
Carlyle Container Co., Charlotte, N. C.
Chase Bag Co., Chicago
Cleveland Lathe & Machine Co., Cleveland
Crystal-X Corp., Lenni Mills, Pa.
Dura-Lee Corp., Kansas City, Mo.
•Ever Ready Label Corp., Belleville, N. J.
Fulton Bag & Cotton Mills, Atlanta, Ga.
Gerrard, A. J., & Co., Melrose Park, Ill.
•Inland Wire Products Co., Chicago
Kimball, A., Co., New York
Maine Potato Bag Co., Caribou, Maine
Mid-States Steel & Wire Co., Crawfordsville, Ind.
•Milprint, Inc., Milwaukee
Mystik Adhesive Products, Chicago
National Transparent Mfg. Co., New York
Pak-Rite Flexible Packaging Co., New York
Par-Pak Co., Lakewood, Ohio
Plastic Packaging Co., Chicago
•Plas-Ties Co., Santa Ana, Calif.
Producers Exchange, Inc., Toledo, Ohio
Robinson, E. S. & A., (Canada) Ltd., Toronto, Ont.
Safeway Products Div., Yorkville Paper Co., New York
St. Regis Paper Co., New York
Samson Plastic Products Co., Beverly Hills, Calif.
Shore Line Industries, Inc., Clinton, Conn.
Tipper Tie, Inc., Union, N. J.
•Trescott Co., Fairport, N. Y.
•Vac-Tie Fasteners, Inc., Elizabeth, N. J.
Visual Bag, Inc., New York

BANDS, PRINTED

(See Labels & Cut Wraps)

BARRIERS

(See Liners)

BOXBOARD

A. *Clay-Coated*
B. *Folding & Set-Up*
C. *Laminated*
D. *Metallic-Coated*
E. *Moistureproof & Greaseproof*

For editorial information, see Sections 3, 6

Alford Cartons, Div. Continental Paper Co., Ridgefield Park, N. J. (A, B, C, E)
Andre Paper Box Co., San Francisco (C, D, E)
Arundel Coating Corp., Baltimore, Md. (D, E)
•Berles Carton Co., Paterson, N. J. (B, C, E)
Brownville Board Co., Brownville, N. Y. (B)
•Butterfield-Barry Co., Teterboro, N. J. (A, B, C, D, E)
Cahill, J. D., Co., Haverhill, Mass. (C, E)
Camp Mfg. Co., Franklin, Va. (A, B)
Canada Foils, Ltd., Toronto, Ont. (D)
Canada Glazed Papers, Ltd., Wexford, Ont. (A, D, E)
Coates Board & Carton Co., Garfield, N. J. (A, B, C, E)
•Cochran Foil Co., Louisville, Ky. (C)
Collison, Lee & Philippi, Inc., Cincinnati (B, C, E)
•Columbia Box Board Mills, Inc., Chatham, N. Y. (B, C, E)
Consolidated Paper Co., Monroe, Mich. (A, B, C, E)
Container Corp. of America, Chicago (A, B, E)
Cornell Paperboard Products Co., Milwaukee (A, B)
Crossett Paper Mills, Crossett, Ark. (B, E)
Crown Paper Board Co., Philadelphia (A, B, C)
Dickinson, John, & Co., Hemel Hempstead, Herts., England (A, B)
Driscoll, Frank H., Co., Winston-Salem, N. C. (C)
East Texas Pulp & Paper Co., Silsbee, Texas (A, B, E)
Electro-Technical Products, Div. Sun Chemical Corp., Nutley, N. J. (C, E)
Federal Paper Board Co., Bogota, N. J. (A, B)
•Fibreboard Products, Inc., San Francisco (A, B, C, E)
•Fisher's Foils Ltd., Wembley, Middx., England (C)
•Fort Orange Paper Co., Castleton-on-Hudson, N. Y. (A, B)
•Gair, Robert, Co., New York (A, B, C, D, E)
Guardian Paper Co., Oakland, Calif. (C, E)
•Hinde & Dauch, Sandusky, Ohio (C, E)
Interstate Folding Box Co., Middletown, Ohio (B, C, E)
Leominster Paper Box Co., Inc., Leominster, Mass. (C)

Liberty Corrugated Container Corp., Brooklyn, N. Y. (A, C, E)
•Lowe Paper Co., Ridgefield, N. J. (A, B, D, E)
MacAndrews & Forbes Co., Camden, N. J. (B, C, E)
Mac Sim Bar Paper Co., Otsego, Mich. (A, B)
•Marathon Corp., Menasha, Wis. (B)
•Matthias Paper Corp., Philadelphia (C)
•Mead Corp., Dayton, Ohio (C)
•Michigan Carton Co., Battle Creek, Mich. (A, B, C, E)
National Foil Co., Elizabeth, N. J. (C)
•National Folding Box Co., Sub. Federal Paper Board Co., New York (A, B)
Nelson, B. F., Mfg. Co., Minneapolis (B, C)
New Haven Board & Carton Co., New Haven, Conn. (A, B)
Newark Paraffine & Parchment Paper Co., Newark, N. J. (C)
•Ohio Boxboard Co., Rittman, Ohio (A, B, C, E)
Orchard Paper Co., St. Louis, Mo. (B, C)
Paperboard Laminated Corp., Norwalk, Conn. (C, D, E)
Paper Converting & Finishing Co., Chicago (D, E)
Puget Sound Pulp & Timber Co., Paperboard Div., Bellingham, Wash. (B)
Robinson, E. S. & A., (Canada) Ltd., Toronto, Ont. (E)
Salwen, Joe, Paper Products Corp., New York (A, B, C, D, E)
Scott & McDonald, Inc., Boston (B)
Shopsin Paper Co., New York (C, D, E)
•Smith, H. P., Paper Co., Chicago (C, E)
Standard Rolling Mills, Brooklyn, N. Y. (C)
Stone Container Corp., Chicago (B, C)
•Sutherland Paper Co., Kalamazoo, Mich. (A, B, C)
•Sweetnam, George H., Inc., Cambridge, Mass. (E)
Tennessee Paper Mills, Inc., Chattanooga, Tenn. (A, B)
Unger Paper Co., New York (C, E)
•United Board & Carton Corp., New York (B, C)
United States Plywood Corp., New York (C)
Upson Co., Lockport, N. Y. (C, E)
Vanant Products, Tomah, Wis. (B, C, D)
Waldorf Paper Products Co., St. Paul, Minn. (A, B, C, D, E)
•Warren, S. D., Co., Boston (A, B)
Western Foil Converters, Berkeley, Calif. (C, E)
Wyomissing Glazed Paper Co., Reading, Pa. (C, D)
Yorktowne Paper Mills, Inc., York, Pa. (B)

BRUSHES, MARKING & STENCILING

For editorial information, see Section 12

Diagraph-Bradley Industries, Inc., Herrin, Ill.
Floquil Products, Inc., Cobleskill, N. Y.
Jet Mfg. Co., Boston
Marsh Stencil Machine Co., Belleville, Ill.
Pannier Corp., Pittsburgh
Speedry Products, Richmond Hill, N. Y.
Time Saving Specialties, Minneapolis

CAN SEALING COMPOUNDS

For editorial information, see Section 9

Cochrane Chemical Co., Matawan, N. J.
•Dewey & Almy Chemical Co., Div. W. R. Grace & Co., Cambridge, Mass.
•Pyroxylin Products, Inc., Chicago
Swift & Co., Chicago
Wilross Products Co., Hawthorne, N. J.

CELLOPHANE

(See Transparent Films, Cellophane)

CLOSURE LINERS

For editorial information, see Section 10

AP Applicator Co., Pleasantville, N. Y.
•Armstrong Cork Co., Lancaster, Pa.
Baltimore Metal Products, Inc., Brooklyn, N. Y.
•Crown Cork & Seal Co., Baltimore, Md.
Electro-Technical Products, Div. Sun Chemical Corp., Nutley, N. J.
•Erno Products Co., Philadelphia
Formold Plastics, Inc., Blue Island, Ill.
Gillon Co., Philadelphia
Gutmann, Ferdinand, & Co., Brooklyn, N. Y.
•H & R Industries, Nazareth, Pa.
Hedwin Corp., Baltimore, Md.
Irvington Div., Minnesota Mining & Mfg. Co., Irvington, N. J.
Malanco, Inc., Blue Island, Ill.
Metal Box Co., London, England
Mundet Cork Corp., No. Bergen, N. J.
•Owens-Illinois Glass Co., Toledo, Ohio
Plastic Packaging Co., Chicago
•Poly-Seal Corp., New York
Standard Insulation Co., East Rutherford, N. J.
Standard Packaging Corp., General Felt Products Div., Brooklyn, N. Y.

CLOSURE SEALING COMPOUNDS

For editorial information, see Section 10

Cochrane Chemical Co., Matawan, N. J.
•Dewey & Almy Chemical Co., Div. W. R. Grace & Co., Cambridge, Mass.
Flintkote Co., New York
Philadelphia Quartz Co., Philadelphia
Polymer Industries, Inc., Springdale, Conn.
•Pyroxylin Products, Inc., Chicago
Swift & Co., Chicago
Wilross Products Co., Hawthorne, N. J.

CLOSURES, APPLICATOR

A. *Atomizer & Spray*
B. *Brush*
C. *Dauber*
D. *Dropper*
E. *Glass*
F. *Rod*

For editorial information, see Section 10

AP Applicator Co., Pleasantville, N. Y. (B, C, D, F)
•Anchor Hocking Glass Corp., Lancaster, Ohio (D)
Applicator Co., Brooklyn, N. Y. (A, B, C, D, E, F)
•Armstrong Cork Co., Lancaster, Pa. (D, E)
Atlantic Plastics, Inc., Stamford, Conn. (A)
Baltimore Metal Products, Inc., Brooklyn, N. Y. (A, B, C)
•Colt's Mfg. Co., Hartford, Conn. (A)
DeVilbiss Co., Toledo, Ohio (A)
•Erno Products Co., Philadelphia (A, B, C, D, E, F)
•Frank, Walter, Elmhurst, Ill. (B, C, D, F)
Grigoleit Co., Decatur, Ill. (D)
•H & R Industries, Nazareth, Pa. (F)
Hydrawlik Co., Roselle, N. J. (A, D)
•Pennsylvania Glass Products Co., Pittsburgh (B, D, E, F)
PharmaPlastics, Inc., Baltimore, Md. (C, D, F)
•Poly-Seal Corp., New York (B, F)
Precision Extruders, Leominster, Mass. (A)
•Products Packaging, Inc., Cleveland (B)
Sterling Seal Co., Erie, Pa. (B)
Terkelsen Machine Co., Boston (C, D)

CLOSURES, BAG

(Clamps & Rings)

For editorial information, see Section 7

Chase Bag Co., Chicago
Cleveland Lathe & Machine Co., Cleveland
Durethene Corp., Chicago
Flexigrip, Inc., New York
Fulton Bag & Cotton Mills, Atlanta, Ga.
Kwik Lok Corp., Yakima, Wash.
•Plas-Ties Co., Santa Ana, Calif.
•Vac-Tie Fasteners, Inc., Elizabeth, N. J.

CLOSURES, CELLULOSE SEALS

(See Closures, Secondary Caps & Bands)

CLOSURES, CROWN

For editorial information, see Section 10

•Armstrong Cork Co., Lancaster, Pa.
Continental Can Co., Crown & Cork Div., Wilmington, Del.
•Crown Cork & Seal Co., Baltimore, Md.
•Erno Products Co., Philadelphia
Gutmann, Ferdinand, & Co., Brooklyn, N. Y.
Mundet Cork Corp., No. Bergen, N. J.

CLOSURES, DRUM, METAL

For editorial information, see Section 17

•American Flange & Mfg. Co., New York
Carlyle Container Co., Charlotte, N. C.
Drum Parts, Inc., Cleveland
Ohio Paper Products Co., Massillon, Ohio
Raible, J. R., Co., Birmingham, Ala.
Upressit Products Corp., Danbury, Conn.
Van Leer's Vatenfabrieken N. V., Amsterdam, Holland
West Penn Mfg. & Supply Corp., Brackenridge, Pa.

CLOSURES, GLASS

For editorial information, see Section 10

Carr-Lowrey Glass Co., Baltimore, Md.
•Erno Products Co., Philadelphia
•Pennsylvania Glass Products Co., Pittsburgh
Richford Corp., New York
Sterling Seal Co., Erie, Pa.
West Penn Mfg. & Supply Corp., Brackenridge, Pa.
Wheaton, T. C., Co., Millville, N. J.

CLOSURES, METAL

For editorial information, see Section 10

Aluminum Co. of America, Pittsburgh
•American Flange & Mfg. Co., New York
American Star Cork Co., Brooklyn, N. Y.
•Anchor Hocking Glass Corp., Lancaster, Ohio
•Armstrong Cork Co., Lancaster, Pa.
Art Tube Co., Irvington, N. J.
•Ball Brothers Co., Muncie, Ind.
Baltimore Metal Products, Inc., Brooklyn, N. Y.
Bernardin Bottle Cap Co., Evansville, Ind.
Clark, J. L., Mfg. Co., Rockford, Ill.
Closures, Inc., Waterbury, Conn.
Consolidated Fruit Jar Co. of N. J., New Brunswick, N. J.
Continental Can Co., Metal Div., New York
Crandall, Inc., Oak Park, Ill.
•Crown Cork & Seal Co., Baltimore, Md.
Crown Cork & Seal Co., Specialty Div., St. Louis, Mo.
Dispensers, Inc., Los Angeles
•Erno Products Co., Philadelphia
Glass Container & Closure Co., Brooklyn, N. Y.
Gutmann, Ferdinand, & Co., Brooklyn, N. Y.
•Hazel-Atlas Glass Co., Wheeling, W. Va.
Keystone Cap Co., Columbia, Pa.
Kimball, A., Co., New York
Metal Box Co., Ltd., London, England

Metal Closures Ltd., West Bromwich, Staffs., England
Metalite, Inc., Meriden, Conn.
Mundet Cork Corp., No. Bergen, N. J.
•Owens-Illinois Glass Co., Toledo, Ohio
•Pennsylvania Glass Products Co., Pittsburgh
Phoenix Metal Cap Co., Chicago
•Reynolds Metals Co., Louisville, Ky.
Richford Corp., New York
Ross Container & Seal Co., New York
Scovill Mfg. Co., Waterbury, Conn.
Sterling Seal Co., Erie, Pa.
Swan Metal Cap Co., Chicago
Tipper Tie, Inc., Union, N. J.
Trio Metal Cap Co., Chicago
Van Leer's Vatenfabrieken N.V., Amsterdam, Holland
West Penn Mfg. & Supply Corp., Brackenridge, Pa.

CLOSURES, METAL

(Tamperproof)

For editorial information, see Section 10

Aluminum Co. of America, Pittsburgh
•American Flange & Mfg. Co., New York
•Anchor Hocking Glass Corp., Lancaster, Ohio
Art Tube Co., Irvington, N. J.
Clark, J. L., Mfg. Co., Rockford, Ill.
Consolidated Fruit Jar Co. of N. J., New Brunswick, N J.
•Frank, Walter, Elmhurst, Ill.
Guardian Safety Seal Co., Chicago
Gutmann, Ferdinand, & Co., Brooklyn, N. Y.
•Hazel-Atlas Glass Co., Wheeling, W. Va.
Metal Closures, Ltd., West Bromwich, Staffs., England
•Reynolds Metals Co., Louisville, Ky.
Sterling Seal Co., Erie, Pa.
Upressit Products Corp., Danbury, Conn.
Van Leer's Vatenfabrieken N.V., Amsterdam, Holland
West Co., Phoenixville, Pa.
West Penn Mfg. & Supply Corp., Brackenridge, Pa.

CLOSURES, MOLDED PLASTIC

For editorial information, see Section 10

A. J. & K. Company, Colchester, Conn.
•American Flange & Mfg. Co., New York
Ames Bag Co., Selma, Ala.
•Anchor Hocking Glass Corp., Lancaster, Ohio
•Armstrong Cork Co., Lancaster, Pa.
Atlantic Plastics, Inc., Stamford, Conn.
Boonton Molding Co., Boonton, N. J.
Buckeye Molding Co., Miamisburg, Ohio
•Colt's Mfg. Co., Hartford, Conn.
Conart Co., Glen Head, N. Y.
Connecticut Plastic Products Co., Waterbury, Conn.
•Continental Can Co., Millsplastic Div., Chicago
Continental Plastics Corp., Chicago
Crandall, Inc., Oak Park, Ill.
Deerfield Plastics Co., So. Deerfield, Mass.
Dispensers, Inc., Los Angeles
•Erno Products Co., Philadelphia
Fil-O-Matic Corp., Chicago
Flyndustries, Inc., New York
Formold Plastics Inc., Blue Island, Ill.
Foster-Grant Co., Leominster, Mass.
•Frank, Walter, Elmhurst, Ill.
Franklin Plastics, Inc., Franklin, Pa.
Grigoleit Co., Decatur, Ill.
Hedwin Corp., Baltimore, Md.
Jamison Plastic Corp., No. Bellmore, N. Y.
Keolyn Plastics, Inc., Chicago
Koller Craft Plastic Products, Fenton, Mo.
Lumelite Corp., Pawling, N. Y.
Lurie Plastics, Inc., Colonial Heights, Va.
•Mack Molding Co., Wayne, N. J.
Maryland Plastics, Inc., New York
Metal Closures Ltd., West Bromwich, Staffs., England
Molded Insulation Co., Philadelphia
Molded Products Div., Admiral Corp., West Chicago, Ill.
Mundet Cork Corp., No. Bergen, N. J.
Nalle Plastics, Inc., Austin, Texas
Norton Laboratories, Inc., Lockport, N. Y.
•Owens-Illinois Glass Co., Toledo, Ohio
Park Plastics Co., Linden, N. J.
•Pennsylvania Glass Products Co., Pittsburgh
PharmaPlastics, Inc., Baltimore, Md.
Phoenix Metal Cap Co., Chicago
Plastomatic Corp., Malvern, Pa.
•Plax Corp., West Hartford, Conn.
•Poly-Seal Corp., New York
Precision Extruders, Leominster, Mass.
Pyro Plastics Corp., Union, N. J.
Richford Corp., New York
Scarmar Mfg. Co., Paterson, N. J.
•Scott Plastics, Hartford, Conn.
Sillcocks-Miller Co., Maplewood, N. J.
Southern Plastics Co., Columbia, S. C.
Steiner Plastics Mfg. Co., Glen Cove, N. Y.
•Sun Tube Corp., Hillside, N. J.
Terkelsen Machine Co., Boston
•Tupper Corp., Blackstone, Mass.
U. S. Rubber Co., New York
Upressit Products Corp., Danbury, Conn.
•Vlchek Tool Co., Cleveland
•Waterbury Companies, Inc., Waterbury, Conn.
Watertown Mfg. Co., Watertown, Conn.
West Co., Phoenixville, Pa.
West Penn Oil Co., Warren, Pa.
Wheaton Plastics Co., Mays Landing, N. J.
•Wheeling Stamping Co., Wheeling, W. Va.
Whyte Mfg. Co., New York
Wilpet Tool & Mfg. Co., Kearny, N. J.
Wilson Plastic Container Corp., Brooklyn, N. Y.
•Wirz, A. H., Inc., Chester, Pa.

CLOSURES, PAIL, METAL

For editorial information, see Section 17

•American Flange & Mfg. Co., New York
Brainard Steel Div., Sharon Steel Corp., Warren, Ohio
Continental Can Co., Metal Div., New York
Upressit Products Corp., Danbury, Conn.
Van Leer's Vatenfabrieken N.V., Amsterdam, Holland

CLOSURES, PARENTERAL

For editorial information, see Section 10

Connecticut Plastic Products Co., Waterbury, Conn.
Gillon Co., Philadelphia
Gutmann, Ferdinand, & Co., Brooklyn, N. Y.
West Co., Phoenixville, Pa.

CLOSURES, POURING SPOUT TYPE

For editorial information, see Section 10

•American Flange & Mfg. Co., New York
Applicator Co., Brooklyn, N. Y.
Art Tube Co., Irvington, N. J.
Buckeye Molding Co., Miamisburg, Ohio
Claremould Plastics Co., Newark, N. J.
Consolidated Fruit Jar Co. of N. J., New Brunswick, N. J.
•Crown Cork & Seal Co., Baltimore, Md.
Dispensers, Inc., Los Angeles
Gutmann, Ferdinand, & Co., Brooklyn, N. Y.
Maryland Plastics, Inc., New York
Metal Box Co., Ltd., London, England
Metalite, Inc., Meriden, Conn.
•Plax Corp., West Hartford, Conn.
•Reynolds Metals Co., Louisville, Ky.
Seal-Spout Corp., Newark, N. J.
Sterling Seal Co., Erie, Pa.
Van Leer's Vatenfabrieken N.V., Amsterdam, Holland
Wheaton Plastics Co., Mays Landing, N. J.
White Metal Mfg. Co., Hoboken, N. J.

CLOSURES, SECONDARY CAPS & BANDS

For editorial information, see Section 10

Aluminum Co. of America, Pittsburgh
•American Viscose Corp., AVISCO Film Div., Philadelphia
•Armstrong Cork Co., Lancaster, Pa.
•Celon Co., Madison, Wis.
•du Pont de Nemours, E. I., & Co., Wilmington, Del.
•Erno Products Co., Philadelphia
Gutmann, Ferdinand, & Co., Brooklyn, N. Y.
Robinson, E. S. & A., (Canada) Ltd., Toronto, Ont.

CLOSURES, SECONDARY CAPS & BANDS

(Foil)

For editorial information, see Section 10

Aluminum Co. of America, Pittsburgh
Avery Paper Co., Painesville, Ohio
Basca Mfg. Co., Div. Huyler's, Indianapolis
Gutmann, Ferdinand, & Co., Brooklyn, N. Y.
•Reynolds Metals Co., Louisville, Ky.
Whitehead & Hoag Co., Newark, N. J.

CLOSURES, SUPPLEMENTARY

(Bottle Applied)

For editorial information, see Section 10

•Erno Products Co., Philadelphia
•Frank, Walter, Elmhurst, Ill.
Gutmann, Ferdinand, & Co., Brooklyn, N. Y.
West Co., Phoenixville, Pa.

CLOSURES, VACUUM

For editorial information, see Section 10

•Anchor Hocking Glass Corp., Lancaster, Ohio
•Crown Cork & Seal Co., Baltimore, Md.
•Erno Products Co., Philadelphia
Gutmann, Ferdinand, & Co., Brooklyn, N. Y.
Metal Closures, Ltd., West Bromwich, Staffs., England
Swan Metal Cap Co., Chicago
Trio Metal Cap Co., Chicago
West Co., Phoenixville, Pa.
White Cap Co., Chicago

CLOSURES, WOOD

For editorial information, see Sections 10, 17

AP Applicator Co., Pleasantville, N. Y.
Bogert & Hopper, Inc., New York
Carlyle Container Co., Charlotte, N. C.
Estes, E. B., & Sons, New York
•Frank, Walter, Elmhurst, Ill.
Sterling Lumber & Supply Co., Chicago
Tell City Furniture Co., Chicago

COATINGS, ASPHALTIC

For editorial information, see Section 3

•Armstrong Cork Co., Lancaster, Pa.
Cochrane Chemical Co., Matawan, N. J.
Flintkote Co., New York
Merchants Chemical Co., So. Norwalk, Conn.
National Waterproof Papers, Inc., Beverly, N. J.
Watson-Standard Co., Pittsburgh

COATINGS, PROTECTIVE, PERMANENT

(Bonding)

For editorial information, see Section 3

Advance Coatings Co., Westminster, Mass.
American Products Mfg. Co., New Orleans, La.
American Resinous Chemicals Corp., Peabody, Mass.
•Armstrong Cork Co., Lancaster, Pa.
Avery Paper Co., Painesville, Ohio
•Bakelite Co., Div. Union Carbide & Carbon Corp., New York
Belding Corticelli Industries, Inc., New York
•Boler Petroleum Co., Philadelphia
Bradley & Vrooman Co., Chicago
Chem-Products, Inc., Rocky Hill, Conn.
Dennis Chemical Co., St. Louis
•Dewey & Almy Chemical Co., Div. W. R. Grace & Co., Cambridge, Mass.
•du Pont de Nemours, E. I., & Co., Wilmington, Del.
Durez Plastics & Chemicals, Inc., No. Tonawanda, N. Y.
Electro-Technical Products, Div. Sun Chemical Corp., Nutley, N. J.
•Fibleco Illinois Corp., Chicago
Firestone Tire & Rubber Co., Plastics Div., Pottstown, Pa.
Floquil Products, Inc., Cobleskill, N. Y.
Hermetite Corp., Carlstadt, N. J.
•Interchemical Corp., Printing Ink Div., New York
Jones-Dabney Co., Newark, N. J.
Krylon, Inc., Philadelphia
Merchants Chemical Co., So. Norwalk, Conn.
Midland Adhesive & Chemical Corp., Ferndale, Mich.
Mor-Gan Laminating & Foliating Co., New York
New Wrinkle, Inc., Dayton, Ohio
Philadelphia Quartz Co., Philadelphia
Polymer Industries, Inc., Springdale, Conn.
Pope & Gray, Inc., Allwood, Clifton, N. J.
•Pyroxylin Products, Inc., Chicago
Raffi & Swanson, Inc., Wilmington, Mass.
Randolph Products Co., Carlstadt, N. J.
•Reslac Chemicals, Inc., Chicago
Robinson, E. S. & A., (Canada) Ltd., Toronto, Ont.
Schwartz Chemical Co., New York
•Semet-Solvay Petrochemical Div., Allied Chemical & Dye Corp., New York
•Sinclair & Valentine Co., New York
Standard Packaging Corp., General Felt Products Div., Brooklyn, N. Y.
Synthetasine Protective Coatings, Inc., New York
Watson-Standard Co., Pittsburgh
Wilross Products Co., Hawthorne, N. J.

COATINGS, PROTECTIVE, REMOVABLE

(Strip Type)

For editorial information, see Section 18

Advance Coatings Co., Westminster, Mass.
American Products Mfg. Co., New Orleans, La.
American Resinous Chemicals Corp., Peabody, Mass.
•Armstrong Cork Co., Lancaster, Pa.
Avery Paper Co., Painesville, Ohio
Babbitt Chemical Co., New Bedford, Mass.
Bischoff Chemical Corp., Ivoryton, Conn.
•Boler Petroleum Co., Philadelphia
Bradley & Vrooman Co., Chicago
Chem-Products, Inc., Rocky Hill, Conn.
Cooper, D. C., Chicago
Dennis Chemical Co., St. Louis, Mo.
Electro-Technical Products, Div. Sun Chemical Corp., Nutley, N. J.
Fronel Services, Inc., New Milford, Conn.
Merchants Chemical Co., So. Norwalk, Conn.
Midland Adhesive & Chemical Corp., Ferndale, Mich.
Polymer Industries, Inc., Springdale, Conn.
Protective Coatings Corp., Atlas Package & Container Corp. Div., Clifton, N. J.
•Pyroxylin Products, Inc., Chicago
Raffi & Swanson, Inc., Wilmington, Mass.
Randolph Products Co., Carlstadt, N. J.
•Reslac Chemicals, Inc., Chicago
Standard Packaging Corp., General Felt Products Div., Brooklyn, N. Y.
Watson-Standard Co., Pittsburgh
Wilross Products Co., Hawthorne, N. J.
Zophar Mills, Inc., Brooklyn, N. Y.

COMPOUNDS, ANTI-BLOCKING

(Release Agents)

For editorial information, see Section 8

Dow Corning Corp., Midland, Mich.
•Injection Molders Supply Co., Cleveland

CONTAINER-BOARD

A. *Fourdrinier Kraft Liner*
B. *Jute Liner*

For editorial information, see Section 17

•Butterfield-Barry Co., Teterboro, N. J. (A, B)
Camp Mfg. Co., Franklin, Va. (A)
Central Fibre Products Co., Quincy, Ill. (B)
Chesapeake Corp. of Virginia, West Point, Va. (A)
Collison, Lee & Philippi, Inc., Cincinnati (A, B)
East Texas Pulp & Paper Co., Silsbee, Texas (A)
•Fibreboard Products, Inc., San Francisco (B)
•Gair, Robert, Co., New York (A)
•Growers Container Corp., Salinas, Calif. (A)
Hammond Bag & Paper Co., Wellsburg, W. Va. (B)
Krafco Container Corp., Dallas, Texas (A)
Liberty Corrugated Container Corp., Brooklyn, N. Y. (A, B)
•Mead Corp., Dayton, Ohio (A)
•National Container Corp., New York (A)
Nelson, B. F., Mfg. Co., Minneapolis (B)
•Ohio Boxboard Co., Rittman, Ohio (B)
Puget Sound Pulp & Timber Co., Paperboard Div., Bellingham, Wash. (B)
River Raisin Paper Co., Monroe, Mich. (A, B)
Salwen, Joe, Paper Products Corp., New York (A)
Stone Container Corp., Chicago (A, B)
Union Bag & Paper Corp., New York (A)
Wabash Fibre Box Co., Terre Haute, Ind. (A, B)
•West Virginia Pulp & Paper Co., New York (A)

CORES, PAPER OR FIBRE

For editorial information, see Sections 6, 18

Central States Paper & Bag Co., St. Louis, Mo.
•Cleveland Container Co., Cleveland
Climax Fibre Drum Co., Carthage, N. Y.
Crescent Paper Tube Co., Covington, Ky.
•Fibreboard Products, Inc., San Francisco
Globe Container Co., San Carlos, Calif.
•Harcord Mfg. Co., Jersey City, N. J.
Marshall Paper Tube Co., Randolph, Mass.
•Mead Corp., Dayton, Ohio
Mercer Paper Tube, Inc., Trenton, N. J.
•Middlesex Paper Tube Co., Lowell, Mass.
Mullery Paper Packages, Inc., St. Paul, Minn.
Ohio Paper Products Co., Massilon, Ohio
Packard Container Corp., Hoboken, N. J.
Platt Corp., Baltimore, Md.
•R. C. Can Co., St. Louis
Ritchie, W. C., & Co., Chicago
•Sefton Fibre Can Co., St. Louis, Mo.
Sonoco Products Co., Hartsville, S. C.
Spenzer Container Corp., Greenville, Pa.
United States Plywood Corp., New York
Universal Tube & Container Co., Waltham, Mass.
Wabash Fibre Box Co., Terre Haute, Ind.

CORK SHEETS

(Paper-Backed)

For editorial information, see Section 18

Continental Can Co., Crown & Cork Div., Wilmington, Del.
Dodge Cork Co., Lancaster, Pa.
•Erno Products Co., Philadelphia
Electro-Technical Products, Div. Sun Chemical Corp., Nutley, N. J.
Standard Packaging Corp., General Felt Products Div., Brooklyn, N. Y.

CORKS

(Plain, Aluminum-, Molded-, or Wood-Top)

For editorial information, see Section 10

American Star Cork Co., Brooklyn, N. Y.
•Armstrong Cork Co., Lancaster, Pa.
Consolidated Fruit Jar Co. of N. J., New Brunswick, N. J.
Dodge Cork Co., Lancaster, Pa.
•Erno Products Co., Philadelphia
•Frank, Walter, Elmhurst, Ill.
Mundet Cork Corp., No. Bergen, N. J.
Schnier, I. F., Co., San Francisco
West Co., Phoenixville, Pa.

CUSHIONING MATERIALS

A. *Padding & Wadding*
B. *Formed Materials*

For editorial information, see Section 18

•American Excelsior Corp., Chicago (A, B)
American Lace Paper Co., Milwaukee (A)
Armour & Co., Curled Hair Div., Alliance, Ohio (A, B)
Avery Paper Co., Painesville, Ohio (A)
Bestpak, Inc., Natick, Mass. (A)
•Blocksom & Co., Michigan City, Ind. (A, B)
Cadillac Products, Inc., Ferndale, Mich. (A, B)
Celotex Corp., Chicago (B)
Celwa Products Co., New York (A, B)
Cincinnati Industries, Inc., Cincinnati (A)
Columbian Rope Co., Auburn, N. Y. (A, B)
Crystal-X Corp., Lenni Mills, Pa. (A, B)
Cushion Pack, Inc., Hawthorne, N. J. (A)
Darby Paper Co., Lansdowne, Pa. (A)
Dow Chemical Co., Midland, Mich. (B)
•Fibleco Illinois Corp., Chicago (A)
Firestone Tire & Rubber Co., Plastics Div., Pottstown, Pa. (A, B)
Flexline Products Co., Los Angeles (B)
Foam King, Inc., Bronx, N. Y. (A, B)
Foam Pak, Philadelphia (B)
Gilman Bros. Co., Gilman, Conn. (A)
•Glo-Brite Products, Chicago (B)
Hedwin Corp., Baltimore, Md. (B)
•Hinde & Dauch, Sandusky, Ohio (A)
Holland Insulated Wire & Cable Works, Ltd., Amsterdam, Holland (A)
Jet-Pak, Inc., Newark, N. J. (A)
•Jiffy Mfg. Co., Hillside, N. J. (A)
Kendall Mills, Div. Kendall Co., Walpole, Mass. (A)
Keyes Fibre Sales Corp., New York (B)
Kimberly-Clark Corp., Neenah, Wis. (A)
L.O.F. Glass Fibers Co., Toledo, Ohio (A, B)
Lansky Die Cutting Corp., New York (B)
Loomis Wadding Co., Hyde Park, Mass. (A)
Malanco, Inc., Blue Island, Ill. (B)
•Matthias Paper Corp., Philadelphia (A)
National Waterproof Papers, Inc., Beverly, N. J. (B)

Nichols Paper Products Co., Green Bay, Wis. (B)
Polymer Industries, Inc., Springdale, Conn. (B)
Queen City Tulatex Corp., Burlington, Vt. (A, B)
Salwen Paper Products Corp., New York (A, B)
Sherman Paper Products Corp., Newton, Mass. (A, B)
•Sweetnam, George H., Inc., Cambridge, Mass. (A)
Union Bag & Paper Corp., New York (B)
Union Wadding Co., Barrington, R. I. (A)
U. S. Rubber Co., New York (B)
Whyte Mfg. Co., New York (B)
Wood Conversion Co., St. Paul, Minn. (A)
Wyndmoor Mfg. Corp., Newark, N. J. (B)
Zonolite Co., Chicago (A)

DAUBERS

(See Closures, Applicator)

DECALCOMANIA TRANSFERS

(See also Labels, Decalcomania)

For editorial information, see Sections 14, 15

American Tag Co., Belleville, N. J.
Austin, O., Brooklyn, N. Y.
Avery Paper Co, Painesville, Ohio
Container Corp. of America, Traver Flexible Packaging Div., Chicago
Continental Decalcomania Co., Sparta, Mich.
Kaumagraph Co., Wilmington, Del.
Meyercord Co., Chicago
Morse Decals, Los Angeles
Palm Bros. Decalcomania Co., Cincinnati
Printed Cellophane Tape Co., Los Angeles
Spielman Co., Philadelphia
Switzer Bros., Inc., Cleveland
Vitachrome, Inc., Los Angeles

DESICCANTS, DEHYDRATING AGENTS

For editorial information, see Section 18

Cooper, D. C., Chicago
Crystal-X Corp., Lenni Mills, Pa.
Culligan, Inc., Desiccant Div., Northbrook, Ill.
Davison Chemical Co., Div. W. R. Grace & Co., Baltimore, Md.
Driaire, Inc., So. Norwalk, Conn.

ELASTIC CORD

(For Mounting)

For editorial information, see Section 16

Dubelier Braid Co., New York
Equality Novelty Co., New York
Fastex, Inc., Cleveland
Firestone Tire & Rubber Co., Plastics Div., Pottstown, Pa.
Goodbar Mfg. Co., Hargood Ribbon Co., New York

EXCELSIOR

A. *Paper* B. *Wood*

(See also Paper, Excelsior & Shredded)

For editorial information, see Section 18

•American Excelsior Corp., Chicago (A, B)
American Shredded Paper Co., Somerville, Mass. (A)
•KVP Co., Kalamazoo, Mich. (A)
Shamrock Paper Co., St. Louis, Mo. (A)
Shredded Paper Products Co., Baltimore, Md. (A)
•Sweetnam, George H., Inc., Cambridge, Mass. (A)
Waxide Paper Co., Kansas City, Mo. (A)

FABRICS

(For Box Wraps, Linings, & Displays)

For editorial information, see Section 16

Chandler Mfg. Co., East Taunton, Mass.
Columbus Coated Fabrics Corp., Columbus, Ohio
Crompton-Richmond Co., New York
•Fibleco Illinois Corp., Chicago
Frankel Associates, Inc., New York
G. & D. Novelty Co., New York
Harte & Co., New York
Kendall Mills, Div., Kendall Co., Walpole, Mass.
Maharam Fabric Corp., New York
Unger Paper Co., New York
Wood Conversion Co., St. Paul, Minn.

FIBROUS GLASS REINFORCEMENT

(For Papers & Tapes)

For editorial information, see Section 5

Ferro Corp., Fiber Glass Div., Nashville, Tenn.
Gustin-Bacon Mfg. Co., Kansas City, Mo.
L.O.F. Glass Fibers Co., Toledo, Ohio
Owens-Corning Fiberglas Corp., New York
Pittsburgh Plate Glass Co., Fiber Glass Div., Pittsburgh

FILMS

(See Transparent Films)

FLOCK

For editorial information, see Section 16

•Claremont Waste Mfg. Co., Claremont, N. H.
Rayon Processing Co. of R. I., Pawtucket, R. I.
•Reynolds Metals Co., Louisville, Ky.
Royal Paper Corp., New York
Switzer Bros., Inc., Cleveland

FLOWERS, ARTIFICIAL

(For Package Decoration)

For editorial information, see Section 16

Arbetter Ribbon & Mfg. Co., Chicago
Cardinal Flower & Novelty Co., New York
•Frank, Walter, Elmhurst, Ill.
G. & D. Novelty Co., New York
Goodbar Mfg. Co., Hargood Ribbon Co., New York
Maharam Fabric Corp, New York
Simpliform Co., St. Louis, Mo.
Zucker, Nathan, New York

FOIL

A. *Coated, Laminated, Etc.*
B. *Embossed, Printed & Decorated*

For editorial information, see Section 4

•Ace Carton Corp., Chicago (B)
•Acme Backing Corp., Stamford, Conn. (A)
Alufoil Products Co., New York (A, B)
Aluminum Rolling Mills Ltd., Cap-de-la-Madeleine, Que. (A, B)
Andre Paper Box Co., San Francisco (A, B)
•Angier Corp., Framingham, Mass. (A)
Anorgana G.M.B.H., Gendorf/Obb., Germany (B)
•Arvey Corp., Chicago (A, B)
Avery Paper Co., Painesville, Ohio (A)
Cadillac Label Co, Kalamazoo, Mich. (B)
Camp Mfg. Co., Franklin, Va. (A, B)
Canada Foils, Ltd., Toronto, Ont. (A, B)
Cello Bag Co., Seattle, Wash. (B)
•Cochran Foil Co., Louisville, Ky. (A, B)
Container Corp. of America, Traver Flexible Packaging Div., Chicago (A, B)
•Continental Can Co., Shellmar-Betner Flexible Packaging Div., Mt. Vernon, Ohio (A, B)
Dejonge, Louis, & Co., New York (A, B)
Dickinson, John, & Co., Hemel Hempstead, Herts., England (A, B)
•Dobeckmun Co., Cleveland (A, B)
Driscoll, Frank H., Co., Winston-Salem, N. C. (A, B)
Dura-Lee Corp., Kansas City, Mo. (B)
Electro-Technical Products, Div. Sun Chemical Corp., Nutley, N. J. (A)
•Ever Ready Label Corp., Belleville, N. J. (B)
•Fisher's Foils Ltd., Wembley, Middx., England (A, B)
Fitzhugh, William W., Inc., New York (B)
Foil Products, Inc., Winston-Salem, N. C. (A, B)
•Foilcraft Printing Corp., Brooklyn, N. Y. (B)
Forbes Lithograph Mfg. Co., Boston (B)
Forsman, C. H., Co., New York (B)
Fuller Label & Box Co., Pittsburgh (A, B)
•Gummed Products Co., Troy, Ohio (A)
•H & R Industries, Nazareth, Pa. (A)
Hazen Paper Co., Holyoke, Mass. (A, B)
•Johnston Foil Mfg. Co., St. Louis, Mo. (A, B)
Kaumagraph Co., Wilmington, Del. (B)
Kupfer Bros. Co., New York (A, B)
Lustour Corp., Clayton, Mo. (B)
•Marathon Corp., Menasha, Wis. (A)
Marvellum Co., Holyoke, Mass. (A, B)
Mason Envelope Co., New York (A, B)
•Matthias Paper Corp., Philadelphia (A, B)
McCoy Label Co., San Francisco (B)
Metal Box Co., Ltd., London, England (A)
Middlesex Products Corp., Cambridge, Mass. (B)
•Milprint, Inc., Milwaukee (A, B)
Modern Packages, Inc., Los Angeles (A, B)
Mountain Waterproof Papers, Inc., Worcester, Mass (A)
National Foil Co., Elizabeth, N. J. (A, B)
Nebel Paper Products Co., Charlotte, N. C. (A, B)
Newark Paraffine & Parchment Paper Co., Newark, N. J. (A, B)
Oak Printing Co., Cleveland (B)
Orchard Paper Co., St. Louis, Mo. (A, B)
Pacific Coast Foil Co., Div. Jorgenson & Co., San Francisco (A, B)
Paperboard Laminating Corp., Norwalk, Conn. (A, B)
Print-A-Tube Co., Rochelle Park, N. J. (A)
Rapinwax Paper Co., Minneapolis (A, B)
Raisin, John T., Corp., San Francisco (A, B)
•Reynolds Metals Co., Louisville, Ky. (A, B)
•Richardson Taylor-Globe Corp., Cincinnati (B)
Robinson, E. S. & A., (Canada) Ltd., Toronto, Ont. (A, B)
Robinson Waxed Paper Co., Bristol, England (A, B)
Rotogravure Packaging, Inc., Addison, Ill. (B)
Royal Paper Corp., New York (A, B)
Scherer, John R., Co., Addison, Ill. (B)
Sherman Paper Products Corp., Newton, Mass. (A)
Shopsin Paper Co., New York (A, B)
•Smith, H. P., Paper Co., Chicago (A)
Smith-Stewart Paper Products, Inc., Brooklyn, N. Y. (A, B)
Southland Paper Converting Co., Los Angeles (A)
Specialty Papers Co., Dayton, Ohio (A, B)
Standard Cellulose & Novelty Co., Richmond Hill, N. Y. (A, B)
Standard Insulation Co., East Rutherford, N. J. (A)

•Standard Packaging Corp., Flex-Vac Div., New York (A, B)
Standard Rolling Mills, Brooklyn, N. Y. (A, B)
•Stranahan Foil Co., So. Hackensack, N. J. (A, B)
Supreme Displays, Inc., New York (B)
Supreme Ribbon Corp., New York (A, B)
Taranger, E., Inc., New York (A, B)
Unger Paper Co., New York (A, B)
•United Board & Carton Corp., New York (A, B)
•United States Packaging Corp., Paterson, N. J. (A)
•Venesta Ltd., London, England (A, B)
Waxide Paper Co., Kansas City, Mo. (A, B)
Western Foil Co., Seattle, Wash. (A, B)
Western Foil Converters, Berkeley, Calif. (A, B)
•Western Waxed Paper Div., Crown Zellerbach Corp., San Leandro, Calif. (A, B)
•Westfield River Paper Co., Russell, Mass. (A)
Whiting, C. R., Co., Hackensack, N. J. (A, B)
Wrapture, Inc., Flushing, N. Y. (A, B)
Wyndmoor Mfg. Corp., Newark, N. J. (A, B)

FOIL, METAL, PLAIN

(Unsupported)

For editorial information, see Section 4

Alufoil Products Co., New York
Aluminum Co. of America, Pittsburgh
•Aluminum Foils, Inc., Jackson, Tenn.
Aluminum Rolling Mills, Ltd., Cap-de-la-Madeleine, Que.
Canada Foils, Ltd., Toronto, Ont.
•Cochran Foil Co., Louisville, Ky.
•Fisher's Foils, Ltd., Wembley, Middx., England
•Johnston Foil Mfg. Co., St. Louis, Mo.
•Kaiser Aluminum & Chemical Corp., Oakland, Calif.
National Foil Co., Elizabeth, N. J.
Pacific Coast Foil Co., Div. Jorgenson & Co., San Francisco
Raisin, John T., Corp., San Francisco
Republic Foil & Metal Mills, Inc., Danbury, Conn.
•Reynolds Metals Co., Louisville, Ky.
Standard Rolling Mills, Brooklyn, N. Y.
•Stranahan Foil Co., So. Hackensack, N. J.
Taranger, E., Inc., New York
•Venesta, Ltd., London, England
Western Foil Co., Seattle, Wash.

GLASS, ROD & TUBING

For editorial information, see Section 10

Corning Glass Works, Corning, N. Y.
Demuth Glass Works, Parkersburg, W. Va.
•Owens-Illinois Glass Co., Toledo, Ohio
•Pennsylvania Glass Products Co., Pittsburgh
Wheaton, T. C., Co., Millville, N. J.

GLUE

(See Adhesives)

HEAT SEALING COMPOUNDS & SUPPLIES

For editorial information, see Sections 5, 11

Advance Coatings Co., Westminster, Mass.
•Boler Petroleum Co., Philadelphia
Cleveland Lathe & Machine Co., Cleveland
Cochrane Chemical Co., Matawan, N. J.
Collier Mfg. Corp., Div. Warren Featherbone Co., Three Oaks, Mich.
Cooper, D. C., Chicago
•du Pont de Nemours, E. I., & Co., Wilmington, Del.
•Federal Adhesives Corp., Brooklyn, N. Y.
Hermetite Corp., Carlstadt, N. J.
Jones-Dabney Co., Newark, N. J.
Merchants Chemical Co., So. Norwalk, Conn.
Nicol, Malcolm, & Co., Hawthorne, N. J.
•Paisley Products, Inc., Div. of Morningstar, Nicol, Inc., New York
Polymer Industries, Inc., Springdale, Conn.
•Pyroxylin Products, Inc., Chicago
Raffi & Swanson, Inc., Wilmington, Mass.
•Reslac Chemicals, Inc., Chicago
Slick Products, New York
Zophar Mills, Inc., Brooklyn, N. Y.

INKS, MARKING & STENCIL

For editorial information, see Sections 12, 14

Acro Tool & Die Works, Chicago
Algene Marking Equipment Co., Garfield, N. J.
•Apex Machine Co., College Point, N. Y.
Braden Sutphin Ink Co., Cleveland
Cleveland Lathe & Machine Co., Cleveland
Diagraph-Bradley Industries, Inc., Herrin, Ill.
Flint, Howard, Ink Co., Detroit
Floquil Products, Inc., Cobleskill, N. Y.
•Gottscho, Adolph, Inc., Hillside, N. J.
•Great Lakes Stamp & Mfg. Co., Chicago
•Industrial Marking Equipment, Inc., New York
Jet Mfg. Co., Boston
•Markhem Machine Co., Keene, N. H.
Marsh Stencil Machine Co., Belleville, Ill.
Matthews, Jas. H., & Co., Pittsburgh
Melind, Louis, Co., Chicago
National Rubber Stamp Works, New York
Pannier Corp., Pittsburgh
Reynolds Ink, Inc., Cleveland
Roberts, Lewis, Inc., Newark, N. J.
Schwartz Chemical Co., New York
•Sinclair & Valentine Co., New York
Speedry Products, Inc., Richmond Hill, N. Y.
Superior Marking Equipment Co., Chicago
Time Saving Specialties, Minneapolis
Unity Stamp Co., New York

INKS, PRINTING

A. *Flexographic*
B. *Fluorescent*
C. *Gravure*
D. *Letterpress*
E. *Lithographic*
F. *Special*

For editorial information, see Section 14

Acheson Dispersed Pigments Co., Philadelphia (C, D, E, F)
Acme Printing Ink Co., Chicago (A, B, C, D, E, F)
Advance Coatings Co., Westminster, Mass. (C, F)
•Apex Machine Co., College Point, N. Y.
•Bensing Bros. & Deeney, Philadelphia (A, B, C, D, E, F)
Braden Sutphin Ink Co., Cleveland (B, D, E, F)
Carlson, John P., Inc., Brooklyn, N. Y. (B, D, E, F)
Claremont Pigment Dispersion Corp., Brooklyn, N. Y. (A, C)
Colora Printing Inks, Inc., Long Island City, N. Y. (A, F)
Converters Ink Co., Linden, N. J. (A)
Crescent Ink & Color Co. of Pa., Philadelphia (A, B, C, D, E, F)
Flint, Howard, Ink Co., Detroit (A, B, C, D, E, F)
Gaetjens, Berger & Wirth, Inc., Brooklyn, N. Y. (A, B, C, D, E, F)
•General Printing Ink Co., Div. Sun Chemical Corp., Long Island City, N. Y. (A, C, D, E)
Gotham Ink & Color Co., Long Island City, N. Y. (A, C)
Hill-Hentschel Co., St. Louis, Mo. (A, D, E, F)
•Interchemical Corp., Printing Ink Div., New York (A, B, C, D, E, F)
Jones-Dabney Co., Newark, N. J. (F)
Levey, Fred'k H., Co., New York (A, B, C, D, E, F)
•Markem Machine Co., Keene, N. H. (F)
Marvellum Co., Holyoke, Mass. (A, C)
Matthews, Jas. H., & Co., Pittsburgh (F)
McCutcheon Bros., & Quality, Inc., Philadelphia (B, D, E, F)
McDonald Printing Co., Cincinnati (A, C, D)
•Pyroxylin Products, Inc., Chicago (A, C)
Radiant Color Co., Oakland, Calif. (B)
Raffi & Swanson, Inc., Wilmington, Mass. (C)
Roberts, Lewis, Inc., Newark, N. J. (B, D, E, F)
Schwartz Chemical Co., New York (F)
•Sinclair & Valentine Co., New York (A, B, C, D, E, F)
Switzer Bros., Inc., Cleveland (B)
Valley Printing Ink Corp., Green Bay, Wis. (D, E, F)
Wilson, W. D., Printing Ink Co., Long Island City, N. Y. (D, E, F)

LABELS & CUT WRAPS

A. *Embossed*
B. *Lithographed*
C. *Printed*
D. *Rotogravure*
E. *Silk Screened*
F. *Transparent*

For editorial information, see Section 15

Ackerman, G. A., Printing Co., Cicero, Ill. (B, C)
Ahrend Associates, New York (B, C)
American Carton Wrapper Co., Chicago (B, C)
American Tag Co., Belleville, N. J. (C, D)
Anderson, A. J., Co., Chicago (A, C)
Angell Mfg. Co., Dayton, Ohio (A)
Arkadia Label Corp., New York (A)
Artcraft Paper Box Co., Los Angeles (A, B, C)
•Arvey Corp., Chicago (A, C, D, F)
Attleboro Printing & Embossing Co., Attleboro, Mass. (A, C)
Austin, O., Brooklyn, N. Y. (E, F)
Bartlett Label Co., Kalamazoo, Mich. (C)
Boxcraft Paper Box Co., Oakland, Calif. (A, C)
Brandau Craig Dickerson Co., Nashville, Tenn. (B, C)
Brett Lithographing Co., Long Island City, N. Y. (B)
Brooks Co., Springfield, Mass. (B)
•Brooks & Porter, Inc., New York (A, B, C, E)
Butler & Ferrigno Lithographic Co., Philadelphia (E)
Cadillac Label Co., Kalamazoo, Mich. (A, C)
Calvert Lithographing Co., Detroit (A, B)
Cambridge Paper Box Co., Cambridge, Mass. (A, B, C)
•Cameo Die & Label Co., New York (A, C, D, F)
Camotone, Inc., Mamaroneck, N. Y. (A, D, F)
Canada Foils, Ltd., Toronto, Ont. (A, C, D)
Cardinal Lithograph Co., Los Angeles (B)
Carton Label & Lithograph Co., San Francisco (B)
Cello Bag Co., Seattle, Wash. (F)

Cellophane Bag & Printing Corp., Brooklyn, N. Y. (F)
Clay Printing Co., Hickory, N. C. (B, C)
Consolidated Lithograph Div., Somerville Ltd., Montreal, Que. (A, B, C)
Continental Decalcomania Co., Sparta, Mich. (E)
Cowan, Elton T., Co., New York (C)
•Crocker, H. S., Co., San Bruno, Calif. (B, C)
Crystal Tube Corp., Chicago (F)
Deline, I. A., Paper Boxes, Inc., Denver, Colo. (A, C)
•Dennison Mfg. Co., Framingham, Mass. (A, C)
Dickinson, John, & Co., Hemel Hempstead, Herts., England (A, B, C)
•Donrico, Inc., New York (A, B, C, E)
Dumatic Industries, Philadelphia (C)
Dura-Lee Corp., Kansas City, Mo. (C, F)
Emeloid Co., Hillside, N. J. (F)
Epsen Lithographing Co., Omaha, Neb. (B)
•Ever Ready Label Corp., Belleville N. J. (A, B, C, D, F)
Fenton Label Co., Philadelphia (C)
Fitzhugh, William W., Inc., New York (A, B, C, D)
Fleishhacker Paper Box Co., San Leandro, Calif. (B, C, D)
Fleming-Potter Co., Peoria, Ill. (A, B, C)
Flexible Tape Co., Memphis, Tenn. (C)
•Foilcraft Printing Corp., Brooklyn, N. Y. (A, C)
Forbes Lithograph Mfg. Co., Boston (A, B, C, D)
Forsman, C. H., Co., New York (A, C)
•Foxon Co., Providence, R. I. (A, C)
•Frank, Walter, Elmhurst, Ill. (A, C, D)
Fuller Label & Box Co., Pittsburgh (A, C, D, F)
Gamper Printing & Bronzing Co., New York (A, C)
Gardner-Neumann, Inc., Brooklyn, N. Y. (A, C)
General Foods Corp., Carton & Container Div., Battle Creek, Mich. (D)
Heat Seal Label Co., New York (B, C)
Herald Press, Inc., Charlotte, N. C. (A, B, C)
•Hollander, Allen, Co., New York (A, C)
Hope Paper Co., Brooklyn, N. Y. (A, C)
•Howell, F. M., & Co., Elmira, N. Y. (A, B, C)
Independent Lithograph Co., San Francisco (A, B, C)
Inland Lithograph Co., Chicago (B)
Kaumagraph Co., Wilmington, Del. (A, B, D)
Kehr Products Co., Philadelphia (C, D, F)
Ketterlinus Litho. Mfg. Co., Primos, Pa. B, C)
Kimball, A., Co., New York (C)
Kittredge, R. J., & Co., Chicago (A, B, C)
Kleist & Co., Portland, Ore. (C)
Krause, Richard M., Inc., New York (A, C)
Kupfer Bros. Co., New York (A, D, F)
Lansky Die Cutting Corp., New York (A)
Lawson & Jones, Ltd., London, Ont. (A, B, C)
Lewy, Morris L., & Co., New York (C)
Libbie Printing Co., Allston, Mass. (B, C, E, F)
Lord Baltimore Press, Baltimore, Md. (A, B, C, D)
Loyal Press, New York (B, C)
Lustour Corp., Clayton, Mo. (D)
Magill-Weinsheimer Co., Lincolnwood, Ill. (B, C)
Mason Envelope Co., New York (F)
Mason, F. E., & Sons, Batavia, N. Y. (A)
•Matthias Paper Corp., Philadelphia (A, C, D)
McCoy Label Co., San Francisco (A, C, F)
McDonald Printing Co., Cincinnati (C, D)
Meehan-Tooker Co., New York (B, C)
Metal Box Co., Ltd., London, England (B, C)
Michigan Lithographing Co., Grand Rapids, Mich. (A, B, C)
Miller & Miller, Inc., Atlanta, Ga. (C)
•Milprint, Inc., Milwaukee (A, B, C, D, E, F)
Milwaukee Label & Seal Co., Milwaukee (C)
Morrill Press, Fulton, N. Y. (C, D)
Moskowitz, Jack, Displays, New York (E)
Muirson Label Co., San Jose, Calif. (A, B, C)
Mullery Paper Packages, Inc., St. Paul, Minn. (C)
Mulligan, James, Printing Co., St. Louis, Mo. (B, C)
Nashua Corp., Nashua, N. H. (C)
National Label Co., Philadelphia (C)
Nebel Paper Products Co., Charlotte, N. C. (B, C)
Nevins Co., Clifton, N. J. (C)
New York Label & Box Corp., New York (B, C)
Niagara Box Factory, Inc., New York (A, C)
Oak Printing Co., Cleveland (C)
Oberly & Newell Lithograph Corp., New York (B, C, E)
Old English Printing & Label Co., Philadelphia (A, C)
•Oliver Machinery Co., Grand Rapids, Mich. (D)
Orchard Paper Co., St. Louis, Mo. (A, B, C, D)
Pacific Coast Foil Co., Div. Jorgenson & Co., San Francisco (A, B, C, D)
Pacific Label Co., Los Angeles (A, C)
Package Products Co., Charlotte, N. C. (C, F)
Packaging Products, Inc., Kansas City, Mo. (A, B, C)
Paramount Paper Products Co., Omaha, Neb. (C)
Paterson Parchment Paper Co., Bristol, Pa. (C)
Penn Lithographing Co., Philadelphia (B)
Phoenix Products Co., Milwaukee (C)
Pictorial Paper Package Corp., Aurora, Ill. (B, C)
Pollock Paper Corp., Div. St. Regis Paper Co., Dallas, Texas (C, D)
Piedmont Label Co., Bedford, Va. (B)
Portland Label Co., Portland, Ore. (C)
Press of H. N. Cornay, New Orleans, La. (A, C)
Price Bros. Lithograph Co., Bridgeton, N. J. (B)
Printed Cellophane Tape Co., Los Angeles (C, E, F)
Process Displays, Inc., Milwaukee (E)
Progress Lithographing Co., Cincinnati (B)
Quadri Color Co., Brooklyn, N. Y. (C)
Reyburn Mfg. Co., Philadelphia (A, C)
•Reynolds Metals Co., Louisville, Ky. (D)
•Richardson Taylor-Globe Corp., Cincinnati (C)
Robinson, E. S. & A., (Canada) Ltd., Toronto, Ont. (A, B, C, D, F)
Roesch, Louis, Co., San Francisco (B)
Rollprint Products Corp., Chicago (B, C, D)
Rossotti Lithograph Corp., No. Bergen, N. J. (B)
Rotogravure Packaging, Inc., Addison, Ill. (A, C, D, F)
•Rowell, E. N., Co., Batavia, N. Y. (A, B, C)
Salem Label Co., Salem, Ohio (C)
Scherer, John R., Co., Addison, Ill. (A, C, D, F)
Schmidt Lithograph Co., San Francisco (A, B)
Shuman, Frank G., Co., Chicago (C)
Simpliform Co., St. Louis, Mo. (C, E)
Spielman Co., Philadelphia (A, B, C, E)
Stecher-Traung Lithograph Corp., Rochester, N. Y. (B)
Steigerwald, A. M., Co., Chicago (A, C, F)
Stylecraft Packaging Service, Inc., Charlotte, N. C. (F)
Supreme Displays, Inc., New York (E)
•Sweetnam, George H., Inc., Cambridge, Mass. (A)
Tablet & Ticket Co., Chicago (A, C)
Talmadge Printing Co., New York (A, B, C)
Trautmann, Bailey & Blampey, New York (E)
Unique Printed Products Co., Terre Haute, Ind. (A, C, F)
•U. S. Printing & Lithograph Co., Cincinnati (A, B, C, D)
U. S. Tape Corp., St. Louis, Mo. (F)
United Wallpaper, Inc., Aurora, Ill. (A, C, D, E)
Utility Plastic Bag Co., Div. Western Burlap Bag Co., Chicago (C)
Velvetone Finishing Corp., Long Island City, N. Y. (E)
Veritone Co., Chicago (B)
W.E.W. Container Co., Brooklyn, N. Y. (F)
Walle & Co., New Orleans, La. (B)
Wedgewood Press, Inc., New York (B, C)
Weil's, David, Sons Lithographic Co., Brooklyn, N. Y. (A, B, C)
Western Lithograph Co., Los Angeles (A, B, C)
•Western Waxed Paper Div., Crown Zellerbach Corp., San Leandro, Calif. (C, D)
Wheeler-Van Label Co., Grand Rapids, Mich. (C)
Williams, Bill, & Co., New York (A, B, C)
Wolf Detroit Envelope Co., Detroit (B)
Wrapture, Inc., Flushing, N. Y. (C, D, F)
Wynekoop, Walker, Inc., Chicago (A, C)

LABELS, DECALCOMANIA

For editorial information, see Section 15

American Tag Co., Belleville, N. J.
Attleboro Printing & Embossing Co., Attleboro, Mass.
Austin, O., Brooklyn, N. Y.
Carton Label & Lithograph Co., San Francisco
Continental Decalcomania Co., Sparta, Mich.
Decal Plas-Stik Co., New York
Dumatic Industries, Philadelphia
Economy Novelty & Printing Co., New York
•Ever Ready Label Corp., Belleville, N. J.
Fuller Label & Box Co., Pittsburgh
Meyercord Co., Chicago
Morse Decals, Los Angeles
Palm Bros. Decalcomania Co., Cincinnati
Printed Cellophane Tape Co., Los Angeles
Scherer, John R., Co., Addison, Ill.
Spielman Co., Philadelphia
Topflight Corp., York, Pa.

LABELS, FOIL

A. *Foil*
B. *Heavy Metal*

For editorial information, see Section 15

Aluminum Rolling Mills Ltd., Cap-de-la-Madeleine, Que. (A)
American Tag Co., Belleville, N. J. (A)
Anderson, A. J., Co., Chicago (A, B)
Angell Mfg. Co., Dayton, Ohio (A, B)
Arkadia Label Corp., New York (A, B)
Artcraft Paper Box Co., Los Angeles (A)
•Arvey Corp., Chicago (A)
Attleboro Printing & Embossing Co., Attleboro, Mass. (A, B)
Avery Paper Co., Painesville, Ohio (A, B)
Bartlett Label Co., Kalamazoo, Mich. (A)
Boxcraft Paper Box Co., Oakland, Calif. (A)
Cadillac Label Co., Kalamazoo, Mich. (A, B)
Camotone, Inc., Mamaroneck, N. Y. (A)
Canada Foils, Ltd., Toronto, Ont. (A)
•Cameo Die & Label Co., New York (A, B)
Cello-Masters, Inc., New York (A)
Continental Decalcomania Co., Sparta, Mich. (A)

Deline, I. A., Paper Boxes, Inc., Denver, Colo. (A)
•Dennison Mfg. Co., Framingham, Mass. (A)
Dickinson, John, & Co., Hemel Hempstead, Herts., England (A)
•Donrico, Inc., New York (A, B)
Driscoll, Frank H., Co., Winston-Salem, N. C. (A, B)
Dumatic Industries, Philadelphia (A)
•Ever Ready Label Corp., Belleville, N. J. (A)
Fitzhugh, William W., Inc., New York (A)
Fleming-Potter Co., Peoria, Ill. (A, B)
•Foilcraft Printing Corp., Brooklyn, N. Y. (A, B)
Foil Products, Inc., Winston-Salem, N. C. (A, B)
Forbes Lithograph Mfg. Co., Boston (A)
Forsman, C. H., Co., New York (A)
•Foxon Co., Providence, R. I. (A, B)
French-Bray Printing Co., Baltimore, Md. (A)
•Frank, Walter, Elmhurst, Ill. (A)
Fuller Label & Box Co., Pittsburgh (A, B)
Gardner-Neumann, Inc., Brooklyn, N. Y. (A)
•Hollander, Allen, Co., New York (A)
House of Harley, Inc., New York (A)
Johnsos-Coppock Co., Skokie, Ill. (A)
Kaumagraph Co., Wilmington, Del. (A)
Kehr Products Co., Philadelphia (A)
Kimball, A., Co., New York (A)
Koch Convertograph Co., Evansville, Ind. (A)
Krause, Richard M., Inc., New York (A)
Lambooy Label & Wrapper Co., Kalamazoo, Mich. (A, B)
Lord Baltimore Press, Baltimore, Md. (A)
Lustour Corp., Clayton, Mo. (A)
Markandy, Inc., Kirkwood, Mo. (A)
Mason, F. E., & Sons, Batavia, N. Y. (A, B)
Matthews, Jas. H., & Co., Pittsburgh (B)
McCoy Label Co., San Francisco (A, B)
Merchandiser Press, Inc., New York (A, B)
Miller Label Co., Tacoma, Wash. (A)
•Milprint, Inc., Milwaukee (A)
Milwaukee Label & Seal Co., Milwaukee (A)
Nebel Paper Products Co., Charlotte, N. C. (A)
Northwestern Paper Box Co., Seattle, Wash. (A)
Oak Printing Co., Cleveland (A)
Oberly & Newell Lithograph Corp., New York (A)
Old English Printing & Label Co., Philadelphia (A)
Orchard Paper Co., St. Louis, Mo. (A)
Pacific Coast Foil Co., Div. Jorgenson & Co., San Francisco (A)
Pacific Label Co., Los Angeles (A, B)
Package Products Co., Charlotte, N. C. (A)
Packaging Products, Inc., Kansas City, Mo. (A)
Printed Cellophane Tape Co., Los Angeles (A)
Raisin, John T., Corp., San Francisco (A)
Reyburn Mfg. Co., Philadelphia (A)
•Reynolds Metals Co., Louisville, Ky. (A)
Robinson, E. S. & A., (Canada) Ltd., Toronto, Ont. (A)
Robinson Waxed Paper Co., Ltd., Bristol, England (A)
Rollprint Products Corp., Chicago (A)
Rotogravure Packaging, Inc., Addison, Ill. (A, B)
Scherer, John R., Co., Addison, Ill. (A, B)
Schmidt Lithograph Co., San Francisco (A)
Simon Adhesive Products Corp., New York (A)
Steigerwald, A. M., Co., Chicago (A, B)
Stylecraft Packaging Service, Inc., Charlotte, N. C. (A)
Tablet & Ticket Co., Chicago (A)
Talmadge Printing Co., New York (A, B)
Tompkins' Label Service, Philadelphia (A)
Unique Printed Products Co., Terre Haute, Ind. (A)
•U. S. Printing & Lithograph Co., Cincinnati (A)
Western Foil Converters, Berkeley, Calif. (A)
Western Lithograph Co., Los Angeles (A)
Wheeler-Van Label Co., Grand Rapids, Mich. (A)
Wrapture, Inc., Flushing, N. Y. (A)
Wynekoop, Walker, Inc., Chicago (A, B)

LABELS, PRESSURE-SENSITIVE

(Self-Adhesive)

For editorial information, see Section 15

American Tag Co., Belleville, N. J.
Anderson, A. J., Co., Chicago
Angell Mfg. Co., Dayton, Ohio
Archer Label Co., Los Angeles
Arkadia Label Corp., New York
•Arvey Corp., Chicago
Atlas Stamp Co., Youngstown, Ohio
Attleboro Printing & Embossing Co., Attleboro, Mass.
Austin, O., Brooklyn, N. Y.
Avery Adhesive Label Corp., Monrovia, Calif.
Bartlett Label Co., Kalamazoo, Mich.
Brady, W. H., Co., Milwaukee
Cadillac Label Co., Kalamazoo, Mich.
•Cameo Die & Label Co., New York
Camotone, Inc., Mamaroneck, N. Y.
Canada Foils, Ltd., Toronto, Ont.
Cardinal Lithograph Co., Los Angeles
Cello-Masters, Inc., New York
Continental Decalcomania Co., Sparta, Mich.
Cowan, Elton T., Co., New York
•Crocker, H. S., Co., San Bruno, Calif.
Decal Plas-Stik Co., New York
•Dennison Mfg. Co., Framingham, Mass.
Dickinson, John, & Co., Hemel Hempstead, Herts., England
Eureka Specialty Printing Co., Scranton, Pa.
•Ever Ready Label Corp., Belleville, N. J.
Fairbairn Tape & Label Co., San Francisco
Fenton Label Co., Philadelphia
Fleming-Potter Co., Peoria, Ill.
Flexible Tape Co., Memphis, Tenn.
•Foilcraft Printing Corp., Brooklyn, N. Y.
•Foxon Co., Providence, R. I.
•Franks, Walter, Elmhurst, Ill.
Fuller Label & Box Co., Pittsburgh
Gardner-Neumann, Inc., Brooklyn, N. Y.
General Films, Inc., Covington, Ohio
Herald Press, Inc., Charlotte, N. C.
•Hollander, Allen, Co., New York
•Howell, F. M., & Co., Elmira, N. Y.
Industrial Tape Printers, Div. Industrial Equipment & Supply Co., Wernersville, Pa.
Johnsos-Coppock Co., Skokie, Ill.
Kaumagraph Co., Wilmington, Del.
Kimball, A., Co., New York
Kittredge, R. J., & Co., Chicago
•Kleen-Stik Products, Inc., Chicago
Label-Rite Co., Weston, Ont.
Lambooy Label & Wrapper Co., Kalamazoo, Mich.
Libbie Printing Co., Allston, Mass.
Magill-Weinsheimer Co., Lincolnwood, Ill.
Markandy, Inc., Kirkwood, Mo.
Mason, F. E., & Sons, Batavia, N. Y.
McCoy Label Co., San Francisco
Meehan-Tooker Co., New York
Miller Label Co., Tacoma, Wash.
Miller & Miller, Inc., Atlanta, Ga.
•Milprint, Inc., Milwaukee
Milwaukee Label & Seal Co., Milwaukee
Mulligan, James, Printing Co., St. Louis, Mo.
Mystik Adhesive Products, Chicago
Nebel Paper Products Co., Charlotte, N. C.
Nevins Co., Clifton, N. J.
New York Label & Box Corp., New York
Oak Printing Co., Cleveland
•Oliver Machinery Co., Grand Rapids, Mich.
Pacific Label Co., Los Angeles
Packaging Products, Inc., Kansas City, Mo.
Palm Bros. Decalcomania Co., Cincinnati
Paramount Paper Products Co., Omaha, Neb.
Penn Lithographing Co., Philadelphia
Phoenix Products Co., Milwaukee
Price Bros. Lithograph Co., Bridgeton, N. J.
Printed Cellophane Tape Co., Los Angeles
Reyburn Mfg. Co., Philadelphia
Robinson, E. S. & A., (Canada) Ltd., Toronto, Ont.
Robinson Tag & Label Co, New York
Rotogravure Packaging, Inc., Addison, Ill.
Salem Label Co., Salem, Ohio
Scherer, John R., Co., Addison, Ill.
Seamless Rubber Co., F.O.S. Industrial Tape Div., New Haven, Conn.
Shuman, Frank G., Co., Chicago
Simon Adhesive Products Corp., New York
Simpliform Co., St. Louis, Mo.
Spielman Co., Philadelphia
Steigerwald, A. M., Co., Chicago
Tablet & Ticket Co., Chicago
Talmadge Printing Co., New York
Tompkins' Label Service, Philadelphia
Topflight Corp., York, Pa.
Transparent Products Co., New York
U. S. Tape Corp., St. Louis
Walle & Co., New Orleans, La.
Wheeler-Van Label Co., Grand Rapids, Mich.
Wrapture, Inc., Flushing, N. Y.
Wynekoop, Walker, Inc., Chicago

LABELS, ROLL TYPE

(For Shipping, Marking, Etc.)

For editorial information, see Section 15

American Tag Co., Belleville, N. J.
Archer Label Co., Los Angeles
Avery Adhesive Label Corp., Monrovia, Calif.
Bartlett Label Co., Kalamazoo, Mich.
Cadillac Label Co., Kalamazoo, Mich.
•Cameo Die & Label Co., New York
Camotone, Inc., Mamaroneck, N. Y.
•Crocker, H. S., Co., San Bruno, Calif.
•Dennison Mfg. Co., Framingham, Mass.
Dickinson, John, & Co., Hemel Hempstead, Herts., England
Dumatic Industries, Philadelphia
Dura-Lee Corp., Kansas City, Mo.
Eureka Specialty Printing Co., Scranton, Pa.
•Ever Ready Label Corp., Belleville, N. J.
Fairbairn Tape & Label Co., San Francisco
Fenton Label Co., Philadelphia
Flexible Tape Co., Memphis, Tenn.
Fuller Label & Box Co., Pittsburgh
General Films, Inc., Covington, Ohio
Herald Press, Inc., Charlotte, N. C.
Hope Paper Co., Brooklyn, N. Y.
•Hollander, Allen, Co., New York
Kimball, A., Co., New York
Lambooy Label & Wrapper Co., Kalamazoo, Mich.
•Marathon Corp., Menasha, Wis.
McCoy Label Co., San Francisco
Miller & Miller, Inc., Atlanta, Ga.
Nashua Corp., Nashua, N. H.
Nebel Paper Products Co., Charlotte, N. C.
•Oliver Machinery Co., Grand Rapids, Mich.
Package Products Co., Charlotte, N. C.
Paramount Paper Products Co., Omaha, Neb.
Reyburn Mfg. Co., Philadelphia
Robinson, E. S. & A., (Canada) Ltd., Toronto, Ont.
Salem Label Co., Salem, Ohio
Shuman, Frank G., Co., Chicago
Simpliform Co., St. Louis, Mo.
Spielman Co., Philadelphia
Steigerwald, A. M., Co., Chicago
Tompkins' Label Service, Philadelphia
Unique Printed Products Co., Terre Haute, Ind.

LABELS, SHIPPING

For editorial information, see Section 15

American Tag Co., Belleville, N. J.
Anderson, A. J., Co., Chicago
Archer Label Co., Los Angeles
Bartlett Label Co., Kalamazoo, Mich.
Butler & Ferrigno Lithographic Co., Philadelphia
Cowan, Elton T., Co., New York
•Dennison Mfg. Co., Framingham, Mass.
Dickinson, John, & Co., Hemel Hempstead, Herts., England
Dura-Lee Corp., Kansas City, Mo.
Epsen Lithographing Co., Omaha, Neb.
Eureka Specialty Printing Co., Scranton, Pa.
•Ever Ready Label Corp., Belleville, N. J.
Fairbairn Tape & Label Co., San Francisco
Fenton Label Co., Philadelphia
Gardner-Neumann, Inc., Brooklyn, N. Y.
General Films, Inc., Covington, Ohio
Herald Press, Inc., Charlotte, N. C.
•Hollander, Allen, Co., New York
•Howell, F. M., & Co., Elmira, N. Y.
Kimball, A., Co., New York
Lambooy Label & Wrapper Co., Kalamazoo, Mich.
Lawson & Jones Ltd., London, Ont.
McCoy Label Co., San Francisco
Michigan Lithographing Co., Grand Rapids, Mich.
Miller Label Co., Tacoma, Wash.
Milwaukee Label & Seal Co., Milwaukee
Mulligan, James, Printing Co., St. Louis, Mo.
Nashua Corp., Nashua, N. H.
National Label Co., Philadelphia
New York Label & Box Corp., New York
Oak Printing Co., Cleveland
Paramount Paper Products Co., Omaha, Neb.
Pictorial Paper Package Corp., Aurora, Ill.
Portland Label Co., Portland, Ore.
Press of H. N. Cornay, New Orleans, La.
Reyburn Mfg. Co., Philadelphia
Robinson Tag & Label Co., New York
Rollprint Products Corp., Chicago
Salem Label Co., Salem, Ohio
Scherer, John R., Co., Addison, Ill.
Schmidt Lithograph Co., San Francisco
Shuman, Frank G., Co., Chicago
Simpliform Co., St. Louis, Mo.
Spielman Co., Philadelphia
Steigerwald, A. M., Co., Chicago
Tablet & Ticket Co., Chicago
Tompkins' Label Service, Philadelphia
Unique Printed Products Co., Terre Haute, Ind.
Walle & Co., New Orleans, La.
Wedgewood Press, Inc., New York
Wheeler-Van Label Co., Grand Rapids, Mich.
Winne, Frank W., & Son, Philadelphia
Wynekoop, Walker, Inc., Chicago

LABELS, STOCK

For editorial information, see Section 15

Archer Label Co., Los Angeles
Attleboro Printing & Embossing Co., Attleboro, Mass.
Avery Paper Co., Painesville, Ohio
Bartlett Label Co., Kalamazoo, Mich.
•Cameo Die & Label Co., New York
•Dennison Mfg. Co., Framingham, Mass.
Dickinson, John, & Co., Hemel Hempstead, Herts, England
Eureka Specialty Printing Co., Scranton, Pa.
•Ever Ready Label Corp., Belleville, N. J.
Fairbairn Tape & Label Co., San Francisco
Fenton Label Co., Philadelphia
Flexible Tape Co., Memphis, Tenn.
Herald Press, Inc., Charlotte, N. C.
•Hollander, Allen, Co., New York
Independent Lithograph Co., San Francisco
Kimball, A., Co., New York
Kittredge, R. J., & Co., Chicago
Lambooy Label & Wrapper Co., Kalamazoo, Mich.
McCoy Label Co., San Francisco
Merchandiser Press, Inc., New York
Miller Label Co., Tacoma, Wash.
National Label Co., Philadelphia
New York Label & Box Corp., New York
Paramount Paper Products Co., Omaha, Neb.
Reyburn Mfg. Co., Philadelphia
Robinson, E. S. & A. (Canada) Ltd., Toronto, Ont.
Rossotti Lithograph Corp., No. Bergen, N. J.
Salem Label Co., Salem, Ohio
Schmidt Lithograph Co., San Francisco
Shuman, Frank G., Chicago
Steigerwald, A. M., Co., Chicago
Tablet & Ticket Co., Chicago
Tompkins' Label Service, Philadelphia
Unique Printed Products Co., Terre Haute, Ind.
Walle & Co., New Orleans, La.
Wheeler-Van Label Co., Grand Rapids, Mich.
•Westfield River Paper Co., Russell, Mass.

LABELS & BANDS, THERMOPLASTIC

For editorial information, see Section 15

Ackerman, G. A., Printing Co., Cicero, Ill.
American Tag Co., Belleville, N. J.
Attleboro Printing & Embossing Co., Attleboro, Mass.
Avery Adhesive Label Corp., Monrovia, Calif.
Bartlett Label Co., Kalamazoo, Mich.
Cadillac Label Co., Kalamazoo, Mich.
Camotone, Inc., Mamaroneck, N. Y.
Canada Foils, Ltd., Toronto, Ont.
•Cameo Die & Label Co., New York
Dumatic Industries, Philadelphia
•Ever Ready Label Corp., Belleville, N. J.
Fairbairn Tape & Label Co., San Francisco
Fenton Label Co., Philadelphia
Fitzhugh, William W., Inc., New York
Flexible Tape Co., Memphis, Tenn.
•Foxon Co., Providence, R. I.
•Frank, Walter, Elmhurst, Ill.
Fuller Label & Box Co., Pittsburgh
Heat Seal Label Co., New York
Herald Press, Inc., Charlotte, N. C.
•Hollander, Allen, Co., New York
•Howell, F. M., & Co., Elmira, N. Y.
Kaumagraph Co., Wilmington, Del.
Lambooy Label & Wrapper Co., Kalamazoo, Mich.
Larido Corp., New York
Lord Baltimore Press, Baltimore, Md.
Loyal Press, New York
Magill-Weinsheimer Co., Lincolnwood, Ill.
•Marathon Corp., Menasha, Wis.
Mason, F. E., & Sons, Batavia, N. Y.
McCoy Label Co., San Francisco
Meehan-Tooker Co., New York
Miller Label Co., Tacoma, Wash.
Miller & Miller, Inc., Atlanta, Ga.
•Milprint, Inc., Milwaukee
Milwaukee Label & Seal Co., Milwaukee
Nashua Corp., Nashua, N. H.
National Label Co., Philadelphia
Nebel Paper Products Co., Charlotte, N. C.
New York Label & Box Corp., New York
Oak Printing Co., Cleveland
Oberly & Newell Lithograph Corp., New York
•Oliver Machinery Co., Grand Rapids, Mich.
Pacific Coast Foil Co., Div. Jorgenson & Co., San Francisco
Pacific Label Co., Los Angeles
Paramount Paper Products Co., Omaha, Neb.
Penn Lithographing Co., Philadelphia
Pollock Paper Corp., Div. St. Regis Paper Co., Dallas, Texas
Press of H. N. Cornay, New Orleans, La.
Printed Cellophane Tape Co., Los Angeles
Robinson, E. S. & A., (Canada) Ltd., Toronto, Ont.
Rotogravure Packaging, Inc., Addison, Ill.
Salem Label Co., Salem, Ohio
Scherer, John R., Co., Addison, Ill.
Shuman, Frank G., Co., Chicago
Simpliform Co., St. Louis, Mo.
Sparks Corp., Philadelphia
Spielman Co., Philadelphia
Stecher-Traung Lithograph Corp., Rochester, N. Y.
Steigerwald, A. M., Chicago
Tompkins' Label Service, Philadelphia
Topflight Corp., York, Pa.
Unique Printed Products Co., Terre Haute, Ind.
Walle & Co., New Orleans, La.
•Western Waxed Paper Div., Crown Zellerbach Corp., San Leandro, Calif.
Wheeler-Van Label Co., Grand Rapids, Mich.
Wrapture, Inc., Flushing, N. Y.

LABELS, WATER-RESISTANT

For editorial information, see Section 15

American Tag Co., Belleville, N. J.
Archer Label Co., Los Angeles
Arkadia Label Corp., New York
Attleboro Printing & Embossing Co., Attleboro, Mass.
Austin, O., Brooklyn, N. Y.
Avery Paper Co., Painesville, Ohio
Bartlett Label Co., Kalamazoo, Mich.
Camotone, Inc., Mamaroneck, N. Y.
Dickinson, John, & Co., Hemel Hempstead, Herts, England
Epsen Lithographing Co., Omaha, Neb.
•Ever Ready Label Corp., Belleville, N. J.
Fairbairn Tape & Label Co., San Francisco
Fitzhugh, William W., Inc., New York
Flexible Tape Co., Memphis, Tenn.
•Foxon Co., Providence, R. I.
Fuller Label & Box Co., Pittsburgh
Herald Press, Inc., Charlotte, N. C.
•Hollander, Allen, Co., New York
Lambooy Label & Wrapper Co., Kalamazoo, Mich.
McCoy Label Co., San Francisco
•Milprint, Inc., Milwaukee
Milwaukee Label & Seal Co., Milwaukee
Nashua Corp., Nashua, N. H.
National Label Co., Philadelphia
New York Label & Box Corp., New York
Oak Printing Co., Cleveland
Pacific Coast Foil Co., Div. Jorgenson & Co., San Francisco
Palm Bros. Decalcomania Co., Cincinnati
Paramount Paper Products Co., Omaha, Neb.
Robinson, E. S. & A., (Canada) Ltd., Toronto, Ont.
Rollprint Products Corp., Chicago
Scherer, John R., Co., Addison, Ill.
Shuman, Frank G., Chicago
Stecher-Traung Lithograph Corp., Rochester, N. Y.
Steigerwald, A. M., Co., Chicago
Tablet & Ticket Co., Chicago
Tompkins' Label Service, Philadelphia
Unique Printed Products Co., Terre Haute, Ind.
•U. S. Printing & Lithograph Co., Cincinnati
U. S. Tape Corp., St. Louis, Mo.
Walle & Co., New Orleans, La.
Western Lithograph Co., Los Angeles
Wheeler-Van Label Co., Grand Rapids, Mich.

LACQUERS & VARNISHES

(See Coatings, Protective)

LAMINATING COMPOUNDS

For editorial information, see Section 4

Adhesive Products Corp., New York
American Resin Corp., Chicago
American Resinous Chemicals Corp., Peabody, Mass.
Angier Products, Inc., Cambridge, Mass.
•Bakelite Co., Div. Union Carbide & Carbon Corp., New York
•Boler Petroleum Co., Philadelphia
Catalin Corp. of America, New York
Cochrane Chemical Co., Matawan, N. J.
Dennis Chemical Co., St. Louis, Mo.
•du Pont de Nemours, E. I., & Co., Wilmington, Del.
Durez Plastics & Chemicals, Inc., No. Tonawanda, N. Y.
Electro-Technical Products, Div. Sun Chemical Corp., Nutley, N. J.
Firestone Tire & Rubber Co., Plastics Div., Pottstown, Pa.
Flintkote Co., New York
Hermetite Corp., Carlstadt, N. J.
Imperial Chemical Industries Ltd., Plastics Div., Welwyn Garden, Herts., England
International Wax Refining Corp., Valley Stream, N. Y.
Jones-Dabney Co., Newark, N. J.
Midland Adhesive & Chemical Corp., Ferndale, Mich.
•Paisley Products, Inc., Div of Morningstar, Nicol, Inc., New York
Philadelphia Quartz Co., Philadelphia
Polymer Industries, Inc., Springdale, Conn.
•Pyroxylin Products, Inc., Chicago
•Reslac Chemicals, Inc., Chicago
Swift & Co., Chicago
Testworth Laboratories, Inc., Addison, Ill.
U. S. Rubber Co., New York
Wilross Products Co., Hawthorne, N. J.
Zophar Mills, Inc., Brooklyn, N. Y.

LATEX

(Rubber or Resin Dispersions)

For editorial information, see Sections 3, 5

Adhesive Products Corp., New York
American Resin Corp., Chicago
American Resinous Chemicals Corp., Peabody, Mass.
Angier Products, Inc., Cambridge, Mass.
Babbitt Chemical Co., New Bedford, Mass.
Bartlett, F. P., & Co., Cambridge, Mass.
•Dewey & Almy Chemical Co., Div. W. R. Grace & Co., Cambridge, Mass.
•du Pont de Nemours, E. I., & Co., Wilmington, Del.
•Federal Adhesives Corp., Brooklyn, N. Y.
Firestone Tire & Rubber Co., Plastics Div., Pottstown, Pa.
Flintkote Co., New York
•Goodyear Tire & Rubber Co., Akron, Ohio
Goodrich, B. F., Chemical Co., Cleveland
Imperial Adhesives Co., Brooklyn, N. Y.
Imperial Chemical Industries Ltd., Plastics Div., Welwyn Garden, Herts., England
Java Latex & Chemical Corp., New York
Midland Adhesive & Chemical Corp., Ferndale, Mich.
•Monsanto Chemical Co., Springfield, Mass.
Naugatuck Chemical Div., United States Rubber Co., Naugatuck, Conn.
•Paisley Products, Inc., Div. Morningstar, Nicol, Inc., New York
Polymer Industries, Inc., Springdale, Conn.
•Pyroxylin Products, Inc., Chicago
•Reslac Chemicals, Inc., Chicago
Rubba, Inc., New York
Swift & Co., Chicago
Tee-Pak, Inc., Chicago
Testworth Laboratories, Inc., Addison, Ill.
Williamson Adhesives, Inc., Skokie, Ill.
Wilross Products Co., Hawthorne, N. J.

LEATHER & LEATHERETTE

For editorial information, see Section 16

Columbus Coated Fabrics Corp., Columbus, Ohio
Dejonge, Louis, & Co., New York
Elm Coated Fabrics Co., New York
Frank, J. P., & Co., New York
Freedman, Leonard, & Sons, New York
Holland Insulated Wire & Cable Works, Ltd., Amsterdam, Holland
Kupfer Bros. Co., New York
Marvellum Co., Holyoke, Mass.
Paper Converting & Finishing Co., Chicago
Plastic Coating Corp., Holyoke, Mass.
Plastic Film Corp., Plainfield, Conn.
Presto Plastic Products Co., New York
Unger Paper Co., New York
Uni-Mark, Inc., Boston
U. S. Rubber Co., New York
Whitehead & Hoag Co., Newark, N. J.
Wyomissing Glazed Paper Co., Reading, Pa.

LINERS, BAG, BARREL, BOX, CASE & DRUM

For editorial information, see Sections 17, 18

Acme Cellophane Converting Corp., Los Angeles
Ames Bag Co., Selma, Ala.
Ames Harris Neville Co., San Francisco
Austin Industries, Inc., Marlboro, Mass.
Bemis Bro. Bag Co., St. Louis, Mo.
Blossom Mfg. Co., New York
Bowaters Sales Co., London, England
Breetwor, I. N., & Assoc., Los Angeles
COSECO, Los Angeles
Cadillac Products, Inc., Ferndale, Mich.
Canton Containers, Inc., Canton, Ohio
Cello-Pack, Inc., Buffalo, N. Y.
Central States Paper & Bag Co., St. Louis, Mo.
Chase Bag Co., Chicago
Cincinnati Industries, Inc., Cincinnati
Collier Mfg. Corp., Warren Featherbone Co., Three Oaks, Mich.
Consolidated Bag Corp., Philadelphia
Continental Paper Products Co., Denver, Colo.
•Cromwell Paper Co., Chicago
Crystal Tube Corp., Chicago
Crystal-X Corp., Lenni Mills, Pa.
Deerfield Plastics Co., So. Deerfield, Mass.
Diaphane Corp., Philadelphia
Dickinson, John, & Co., Hemel Hempstead, Herts., England
Dura-Lee Corp., Kansas City, Mo.
Electronic Wave Products, Inc., New York
Elm Coated Fabrics Co., New York
•Equitable Paper Bag Co., Long Island City, N. Y.
•Fibleco Illinois Corp., Chicago
Fulton Bag & Cotton Mills, Atlanta, Ga.
•Growers Container Corp., Salinas, Calif.
•H & R Industries, Nazareth, Pa.
•Hamersley Mfg. Co., Garfield, N. J.
Hedwin Corp., Baltimore, Md.
Howard Plastics, Inc., Council Bluffs, Iowa
•Jiffy Mfg. Co., Hillside, N. J.
•KVP Co., Kalamazoo, Mich.
Kehr Products Co., Philadelphia
Kennedy Car Liner & Bag Co., Shelbyville, Ind.
•Kordite Corp., Macedon, N. Y.
Kuss, R. L., & Co., Findlay, Ohio
Leeds Paper Products, Inc., Leeds, Mass.
Mehl Mfg. Co., Cincinnati
Metal Box Co., Ltd., London, England
•Milprint, Inc., Milwaukee
Mountain Waterproof Papers, Inc., Worcester, Mass.
Nashua Corp., Nashua, N. H.
National Waterproof Papers, Inc., Beverly, N. J.
Newark Paraffine & Parchment Paper Co., Newark, N. J.
Orchard Paper Co., St. Louis, Mo.
Pacific Coast Foil Co., Div. Jorgenson & Co., San Francisco
Packageers Co., Chicago
Packageneers, Foster, Ohio
Pak-Rite Flexible Packaging Co., New York
Paper Converting & Finishing Co., Chicago
Par-Pak Co., Lakewood, Ohio
Paterson Parchment Paper Co., Bristol, Pa.
Philadelphia Quartz Co., Philadelphia
Plastic Packaging Co., Chicago
Print-A-Tube Co., Rochelle Park, N. J.
Propack, Inc., Hingham, Mass.
Protective Coatings Corp., Atlas Package & Container Corp. Div., Clifton, N. J.
Protective Lining Corp., New York
•Quatrum Corp., Chicago
•Queen Transparent Specialties, Chicago
Robinson, E. S. & A., (Canada) Ltd., Toronto, Ont.
Ruberoid Co., New York
Samson Plastic Products Co., Beverly Hills, Calif.
Shore Line Industries, Inc., Clifton, Conn.
Southland Paper Converting Co., Los Angeles
Spec-Fab Co., Philadelphia
Standard Rolling Mills, Brooklyn, N. Y.
•Sweetnam, George H., Inc., Cambridge, Mass.
Tee-Pak, Inc., Chicago
•Thilmany Pulp & Paper Co., Kaukauna, Wis.
Transparent Packaging Corp., New York
Twitchell, E. W., Inc., Packaging Div., Philadelphia
United Mineral & Chemical Corp., New York
Utility Plastic Bag Co., Div. Western Burlap Bag Co., Chicago
Vanant Products, Tomah, Wis.
Vis-A-Pac Co., Beverly, N. J.
West Carrollton Parchment Co., West Carrollton, Ohio
•Western Waxed Paper Div., Crown Zellerbach Corp., San Leandro, Calif.
Winzen Research, Inc., Minneapolis
Wraps, Inc., New York
Wrapture, Inc., Flushing, N. Y.
Wyndmoor Mfg. Corp., Newark, N. J.

LINERS, CLOSURE

(See Closure Liners)

MARKING TYPE

(Brass, Rubber, Steel)

For editorial information, see Sections 12, 14

Acro Tool & Die Works, Chicago
Algene Marking Equipment Co., Garfield, N. J.
Altair Machinery Corp., New York
•Apex Machine Co., College Point, N. Y.
•Gottscho, Adolph, Inc., Hillside, N. J.
•Industrial Marking Equipment, Inc., New York
Kimball, A., Co., New York
Matthews, Jas. H., & Co., Pittsburgh
National Rubber Stamp Works, New York
•Olsenmark Corp., New York
•Rau Rubber Engraving Co., Hackensack, N. J.
Superior Marking Equipment Co., Chicago

OPENING TAPE

(For Cellophane Packages)

For editorial information, see Section 7

Chicago Printed String Co., Chicago
•Dobeckmun Co., Cleveland
Walsello Products, Inc., Paterson, N. J.

PADDING & WADDING
(See Cushioning Materials)

PALLETS

A. *Metal*
B. *Paper or Fibre Board*
C. *Wood*

For editorial information, see Section 18

Acme Pallet Co., New York (A, C)
Bigelow-Garvey Lumber Co., Chicago (C)
Bogert & Hopper, Inc., New York (C)
Central Fibre Products Co., Quincy, Ill. (B)
Chippewa Paper Products Co., Chicago (B)
Climax Fibre Drum Co., Carthage, N. Y. (B)
Clinch-Tite Corp., Boston (C)
Container Corp. of America, Chicago (B)
Cozier Container Corp., Cleveland (B, C)
Crook Paper Box Co., No. Kansas City, Mo. (B)
Dubuque Container Co., Dubuque, Iowa (B)
Elizabeth Iron Works, Inc., Union, N. J. (A)
Estes, E. B., & Sons, New York (C)
Fab-Weld Corp., Philadelphia (A)
Factory Service Co., Milwaukee (A)
Federal Container Corp., Minneapolis (B)
Fichte, Otto F., & Son, Hollis, N. Y.
Fitzhugh, William W., Inc., New York (B)
•Gair, Robert, Co., New York (B)
General Box Co., Des Plaines, Ill. (C)
•Hinde & Dauch, Sandusky, Ohio (B)
Hines Pallet Co., Mount Airy, N. C. (C)
Hollinger Corp., Arlington, Va. (B)
Ironbound Box & Lumber Co., Hillside, N. J. (C)
Krafco Container Corp., Dallas, Texas (B)
Lange & Crist Box & Lumber Co., Clarksburg, W. Va. (C)
Lawless Bros. Container Corp., No. Tonawanda, N. Y. (B)
Lea, David M., & Co., Richmond, Va. (C)
M-H Standard Co., Jersey City, N. J. (A)
Main Bros. Box & Lumber Co., Karnak, Ill. (C)
Martin Bros. Box Co., Toledo, Ohio (C)
Mohawk Containers, Inc., New Hartford, N. Y. (B)
National Pallet Corp., Pittsburgh (C)
Nelson Co., Baltimore, Md. (C)
Oakwood Products Co., Narragansett, R. I. (C)
Ottawa River Paper Co., Toledo, Ohio (B)
Pulp Reproduction Co., Milwaukee (B)
Re-Bo Mfg. Co., New York (C)
•Reynolds Metals Co., Louisville, Ky. (A)
Roura Iron Works, Inc., Detroit (A)
Seattle Box Co., Seattle, Wash. (C)
Skill-Craft, Inc., Akron, Ohio (C)
South Bend Box Co., Div. General Building Materials, Inc., South Bend, Ind. (C)
Southern Lumber & Mfg. Co., Ellijay, Ga. (C)
Specification Packaging Engineering Corp., Burbank, Calif. (C)
Sterling Lumber & Supply Co., Chicago (C)
Stiles Conveyors & Transmissions, Miami, Fla. (A, C)
Stokes Equipment Co., Philadelphia (A, C)
Townson, W. D., Lumber Co., Murphy, N. C., (A, C)
Union Steel Products Co., Albion, Mich. (A)
Upson Co., Lockport, N. Y. (B)
Waldorf Paper Products Co., St. Paul, Minn. (B)
Williamsburg Millwork Corp., Williamsburg, Va. (C)
Wabash Fibre Box Co., Terre Haute, Ind. (B)
Wood Pallet Co., New York (C)
Woodward Lumber Co., Brattleboro, Vt. (C)

PAPER, ALKALI-PROOF

For editorial information, see Section 3

•Arvey Corp., Chicago
Canada Glazed Papers, Ltd., Wexford, Ont.
Canada Paper "Wholesale" Ltd., Toronto, Ont.
Champion-International Co., Lawrence, Mass.
Chase Bag Co., Chicago
Collison, Lee & Philippi, Inc., Cincinnati
•Crocker, Burbank Papers, Inc., Fitchburg, Mass.
Electro-Technical Products, Div. Sun Chemical Corp., Nutley, N. J.
Fitchburg Paper Co., Fitchburg, Mass.
•Hamersley Mfg. Co., Garfield, N. J.
•KVP Co., Kalamazoo, Mich.
Kupfer Bros. Co., New York
McDonald Printing Co., Cincinnati
Oxford Paper Co., New York
Paper Converting & Finishing Co., Chicago
•Rhinelander Paper Co., Rhinelander, Wis.
•Riegel Paper Corp., New York
St. Regis Paper Co., New York
Specialty Papers Co., Dayton, Ohio
Standard Insulation Co., East Rutherford, N. J.
Standard Packaging Corp., General Felt Products Div., Brooklyn, N. Y.
Western Lithograph Co., Los Angeles
Wyomissing Glazed Paper Co., Reading, Pa.

PAPER, ANTI-TARNISH

For editorial information, see Section 3

Camp Mfg. Co., Franklin, Va.
Champion-International Co., Lawrence, Mass.
Chase Bag Co., Chicago
Collison, Lee & Philippi, Inc., Cincinnati
•Crocker, Burbank Papers, Inc., Fitchburg, Mass.
•Cromwell Paper Co., Chicago
Crystal Tissue Co., Middletown, Ohio
•KVP Co., Kalamazoo, Mich.
Kupfer Bros. Co., New York
•Matthias Paper Corp., Philadelphia
Nox-Rust Div., Daubert Chemical Co., Chicago
Orchard Paper Co., St. Louis, Mo.
Paper Converting & Finishing Co., Chicago
Paterson Parchment Paper Co., Bristol, Pa.
Price Bros. Lithograph Co., Bridgeton, N. J.
•Riegel Paper Corp., New York
Royal Paper Corp., New York
St. Regis Paper Co., New York
Schroeder, Arthur, Paper Co., New York
Shawano Paper Mills, Shawano, Wis.
•Warren, S. D., Boston
Western Lithograph Co., Los Angeles
Whiting, C. R., Co., Hackensack, N. J.
Wyomissing Glazed Paper Co., Reading, Pa.

PAPER, BOX COVERS
(See Paper, Fancy Printed or Embossed)

PAPER, CLOTH-LINED

For editorial information, see Section 3

•Arvey Corp., Chicago
Chase Bag Co., Chicago
Cincinnati Industries, Inc., Cincinnati
Dickinson, John, & Co., Hemel Hempstead, Herts., England
Electro-Technical Products, Div. Sun Chemical Corp., Nutley, N. J.
Franc-Graham Paper Co., New York
Fuller Label & Box Co., Pittsburgh
Kupfer Bros. Co., New York
Middlesex Products Corp., Cambridge, Mass.
Mountain Waterproof Papers, Inc., Worcester, Mass.
Nashua Corp., Nashua, N. H.
National Waterproof Papers, Inc., Beverly, N. J.
Orchard Paper Co., St. Louis, Mo.
Pacific Coast Foil Co., Div. Jorgenson & Co., San Francisco
Paper Converting & Finishing Co., Chicago
Rapinwax Paper Co., Minneapolis
Royal Paper Corp., New York
Ruberoid Co., New York
Unger Paper Co., New York
Wyndmoor Mfg. Corp., Newark, N. J.
Wyomissing Glazed Paper Co., Reading, Pa.

PAPER, COATED, DECORATIVE

A. *Casein-Coated*
B. *Lacquer-Coated*
C. *Mat- or Antique-Coated*
D. *Metallic Coated (Plain & Embossed)*
E. *Mica-Coated*
F. *Varnish-Coated*

For editorial information, see Sections 3, 16

•Acme Backing Corp., Stamford Conn. (A)
Alufoil Products Co., New York (D)
Anderson, George W., Inc., Long Island City, N. Y. (F)
Artcote Papers, Inc., Irvington, N. J. (D)
Bowaters Sales Co., London, England (A)
Canada Glazed Papers, Wexford, Ont. (A, B, C, D, E, F)
Champion-International Co., Lawrence, Mass. (A)
•Champion Paper & Fibre Co., Hamilton, Ohio (A)
•Clopay Corp., Cincinnati (A, B, C, F)
•Crocker, Burbank Papers, Inc., Fitchburg, Mass. (A, B, C, E, F)
Dejonge, Louis, & Co., New York (A, B, C, D, E, F)
Dickinson, John, & Co., Hemel Hempstead, Herts., England (D)
East Texas Pulp & Paper Co., Silsbee, Texas (A)
Electro-Technical Products, Div. Sun Chemical Corp., Nutley, N. J. (A, B, E, F)
Fitzhugh, William W., Inc., New York (F)
Franc-Graham Paper Co., New York (A, C, D)
Freedman, Leonard, & Sons, New York (B)
G & T Mfg. Co., New Britain, Conn. (D)
•Hartford City Paper Co., Hartford City, Ind. (D, F)
Hazen Paper Co., Holyoke, Mass. (B, C, D, E, F)
Kupfer Bros. Co., New York (A, B, C, D, E, F)
•Lachman-Novasel Paper Corp., New York (A, B, C, D, E, F)
Marvellum Co., Holyoke, Mass. (A, D, E)
•Matthias Paper Corp., Philadelphia (A, B, C, D, E, F)
McLaurin-Jones Co., Brookfield, Mass. (A, D)
•Middlesex Products Corp., Cambridge, Mass. (A, C, D, E)
Nashua Corp., Nashua, N. H. (D)
New England Card & Paper Co., Springfield, Mass. (A, C, E)
Orchard Paper Co., St. Louis, Mo. (A, B, C, D, E, F)
Oxford Paper Co., New York (A)
Pacific Coast Foil Co., Div. Jorgenson & Co., San Francisco (B, D)
Paper Converting & Finishing Co., Chicago (B, D, E, F)
Papyrus Co., Kenilworth, N. J. (D)

Plastic Coating Corp., Holyoke, Mass. (B, D)
Pyrotex Leather Co., Leominster, Mass. (B, C, D)
•Pyroxylin Products, Inc., Chicago (B, F)
Raisin, John T., Corp., San Francisco (B)
Rapinwax Paper Co., Minneapolis (B, D)
Reading Glazed Paper Corp., Reading, Pa. (A, C, E)
•Rhinelander Paper Co., Rhinelander, Wis. (B)
•Riegel Paper Corp., New York (B, F)
Robinson, E. S. & A., (Canada) Ltd., Toronto, Ont. (B, D)
Robinson Waxed Paper Co., Bristol, England (B)
Royal Paper Corp., New York (A, B, C, D, E, F)
Rupaco Paper Corp., Brooklyn, N. Y. (D)
Schroeder, Arthur, Paper Co., New York (A)
Shopsin Paper Co., New York (B, D)
Smith-Stewart Paper Products, Inc., Brooklyn, N. Y. (A, B, C, D, F)
Standard Insulation Co., East Rutherford, N. J. (B, F)
Standard Packaging Corp., General Felt Products Div., Brooklyn, N. Y. (A, F)
Supreme Ribbon Corp., New York (A, D)
Unger Paper Co., New York (A, B, C, D)
Uni-Mark, Inc., Boston (B)
United Wallpaper, Inc., Aurora, Ill. (A, E)
•Warren, S. D., Co., Boston (A, D)
Western Foil Co., Seattle, Wash. (D)
Western Foil Converters, Berkeley, Calif. (B)
•Western Waxed Paper Div., Crown Zellerbach Corp., San Leandro, Calif. (B, D)
Whiting, C. R., Co., Hackensack, N. J. (A, B, C, D, E, F)
Wyndmoor Mfg. Corp., Newark, N. J. (A, B, C, D, F)
Wyomissing Glazed Paper Co., Reading, Pa. (A, B, C, D, E)

PAPER, COATED, PROTECTIVE

A. *Hot Melts*
B. *Lacquers*
C. *Polyethylene*
D. *Resinous*

For editorial information, see Section 3

•Acme Backing Corp., Stamford, Conn. (B, D)
Aladdin Products Co., Woodside, N. Y. (C)
Andre Paper Box Co., San Francisco (C)
•Angier Corp., Framingham, Mass. (D)
Angier Products, Inc., Cambridge, Mass. (A, D)
Arkell Safety Bag Co., New York (C)
•Arvey Corp., Chicago (A, B, C, D)
•Bakelite Co., Div. Union Carbide & Carbon Corp., New York (D)
COSECO, Los Angeles (C)
Cahill, J. D., Co., Haverhill, Mass. (C)
Camotone, Inc., Mamaroneck, N. Y. (A, B, D)
Canada Glazed Papers, Ltd., Wexford, Ont. (C, D)
Central Waxed Paper Co., Chicago (A, C)
Cheslam Corp., Yonkers, N. Y. (C)
Cincinnati Industries, Inc., Cincinnati (A, C, D)
•Clopay Corp., Cincinnati (B, D)
Container Corp. of America, Traver Flexible Packaging Div., Chicago (C)
Converter Corp., Leominster, Mass. (B)
•Crocker, Burbank Papers, Inc., Fitchburg, Mass. (B, C, D)
Dejonge, Louis, & Co., New York (B)
Dixie Wax Paper Co., Dallas, Texas (A, B, C)
•Dobeckmun Co., Cleveland (C)
Electro-Technical Products, Div. Sun Chemical Corp., Nutley, N. J. (A, B, C, D)
•Fibleco Illinois Corp., Chicago (A, C)
General Waxed Papers, Inc., Chicago (C)
Guardian Paper Co., Oakland, Calif. (C)
•H & R Industries, Nazareth, Pa. (C, D)
•Hamersley Mfg. Co., Garfield, N. J. (A, C)
Hazen Paper Co., Holyoke, Mass. (B)
Holland Insulated Wire & Cable Works, Ltd., Amsterdam, Holland (C)
•KVP Co., Kalamazoo, Mich. (A, C)
Kordite Corp., Macedon, N. Y.
Kupfer Bros. Co., New York (B, C)
•Lowe Paper Co., Ridgefield, N. J. (C)
Marvellum Co., Holyoke, Mass. (C)
•Matthias Paper Corp., Philadelphia (A, B, C)
McLaurin-Jones Co., Brookfield, Mass. (C)
Metal Box Co., London, England (C)
National Foil Co., Elizabeth, N. J. (A, B)
Newark Paraffine & Parchment Paper Co., Newark, N. J. (C)
Orchard Paper Co., St. Louis, Mo. (B, C)
Pacific Coast Foil Co., Div. Jorgenson & Co., San Francisco (B, D)
Paper Converting & Finishing Co., Chicago (A, B, D)
Papyrus Co., Kenilworth, N. J. (C)
Paterson Parchment Paper Co., Bristol, Pa. (A, D)
Plastic Coating Corp., Holyoke, Mass. (B)
Plastic Film Corp., Plainfield, Conn. (C, D)
Print-A-Tube Co., Rochelle Park, N. J. (C)
Protective Coatings Corp., Atlas Package & Container Corp. Div., Clifton, N. J. (D)
Pyrotex Leather Co., Leominster, Mass. (B, D)
•Pyroxylin Products, Inc., Chicago (A, B, D)
Rapinwax Paper Co., Minneapolis (A, B)
•Rhinelander Paper Co., Rhinelander, Wis. (B)
•Riegel Paper Corp., New York (A, B, C, D)
Robinson, E. S. & A., (Canada) Ltd., Toronto, Ont. (A, B, D)
Robinson Waxed Paper Co., Bristol, England (A, B, C)
Royal Paper Corp., New York (B, C, D)
Shawmut Waxed Paper Co., Holliston, Mass. (C)
•Smith, H. P., Paper Co., Chicago (A, C)
Specialty Papers Co., Dayton, Ohio (B)
Standard Insulation Co., East Rutherford, N. J. (B, D)
Standard Packaging Corp., General Felt Products Div., Brooklyn, N. Y. (A, C, D)
•Thilmany Pulp & Paper Co., Kaukauna, Wis. (C)
Unger Paper Co., New York (C)
•United States Packaging Corp., Paterson, N. J. (C)
•Warren, S. D., Co., Boston (D)
Waxide Paper Co., Kansas City, Mo. (B, C)
Western Foil Converters, Berkeley, Calif. (B)
•Western Waxed Paper Div., Crown Zellerbach Corp., San Leandro, Calif. (A, B, C, D)

PAPER, CORRUGATED

(Flexible, Wrapping & Packing)

For editorial information, see Section 18

•Angier Corp., Framingham, Mass.
Arkell Safety Bag Co., New York
Bowaters Sales Co. Ltd., London, England
Chippewa Paper Products Co., Chicago
Collison, Lee & Philippi, Inc., Cincinnati
Dixie Container Corp., Richmond, Va.
Feaver, John H., Paper Co., Bala-Cynwyd, Pa.
•Fibleco Illinois Corp., Chicago
•Fibreboard Products, Inc., San Francisco
Fitzhugh, William W., Inc., New York
•Gaylord Container Corp., St. Louis, Mo.
Grand City Container Corp., No. Bergen, N. J.
•Growers Container Corp., Salinas, Calif.
•Hinde & Dauch, Sandusky, Ohio
Kieffer Paper Mills, Ewing, Ind.
Malanco, Inc., Blue Island, Ill.
Mohawk Containers, Inc., New Hartford, N. Y.
Murnane Paper Co., Chicago
•National Container Corp., New York
River Raisin Paper Co., Monroe, Mich.
St. Regis Paper Co., New York
Salwen, Joe, Paper Products Corp., New York
Schiffenhaus Bros., Newark, N. J.
Schmidt Lithograph Co., San Francisco
Sherman Paper Products Corp., Newton, Mass.
•Sweetnam, George H., Inc., Cambridge, Mass.
Wabash Fibre Box Co., Terre Haute, Ind.
Wyndmoor Mfg. Corp., Newark, N. J. (A, B, C, D)

PAPER, CORRUGATED

(For Window Trimming)

For editorial information, see Section 14

Central Fibre Products Co., Quincy, Ill.
Chippewa Paper Products Co., Chicago
•Fibreboard Products, Inc., San Francisco
Fuller Displays, Inc., Long Island City, N. Y.
Papyrus Co., Kenilworth, N. J.
Reyburn Mfg. Co., Philadelphia
Schmidt Lithograph Co., San Francisco
•Sweetnam, George H., Inc., Cambridge, Mass.

PAPER, CREPE

For editorial information, see Section 3

•Angier Corp., Framingham, Mass.
Arkell Safety Bag Co., New York
Camp Mfg. Co., Franklin, Va.
Chase Bag Co., Chicago
Cincinnati Industries, Inc., Cincinnati
•Crocker, Burbank Papers, Inc., Fitchburg, Mass.
•Dennison Mfg. Co., Framingham, Mass.
Green Bay Tissue Mills, Green Bay, Wis.
Kieffer Paper Mills, Ewing, Ind.
•Melrose Packaging, New York
National Waterproof Papers, Inc., Beverly, N. J.
Nichols Paper Products Co., Green Bay, Wis.
Papyrus Co., Kenilworth, N. J.
Ruberoid Co., New York
St. Regis Paper Co., New York
•Sweetnam, George H., Inc., Cambridge, Mass.
•Thilmany Pulp & Paper Co., Kaukauna, Wis.

PAPER, EXCELSIOR & SHREDDED

For editorial information, see Section 18

•American Excelsior Corp., Chicago
American Shredded Paper Co., Somerville, Mass.
Brooks Paper Co., St. Louis, Mo.
Crystal Tissue Co., Middletown, Ohio
Erving Paper Mills, Erving, Mass.
•KVP Co., Kalamazoo, Mich.
Newark Paraffine & Parchment Paper Co., Newark, N. J.
Paterson Parchment Paper Co., Bristol, Pa.
Potlatch Forests, Inc., Pomona, Calif.
Security Carton Co., Mobile, Ala.
Shredded Paper Products Co., Baltimore, Md.
•Sweetnam, George H., Inc., Cambridge, Mass.
West Carrollton Parchment Co., West Carrollton, Ohio
•Western Waxed Paper Div., Crown Zellerbach Corp., San Leandro, Calif.

PAPER, FANCY PRINTED OR EMBOSSED

For editorial information, see Sections 3, 16

American Lace Paper Co., Milwaukee
Anderson, George W., Inc., Long Island City, N. Y.
•Arvey Corp., Chicago
Camotone, Inc., Mamaroneck, N. Y.
Canada Foils, Ltd., Toronto, Ont.
Canada Glazed Papers, Ltd., Wexford, Ont.
Canada Paper "Wholesale" Ltd., Toronto, Ont.
Central States Paper & Bag Co., St. Louis, Mo.
•Champion Paper & Fibre Co., Hamilton, Ohio
Chandler Mfg. Co., East Taunton, Mass.
Chicago Printed String Co., Chicago
•Clopay Corp., Cincinnati
Codd Paper Co., New York
Converter Corp., Leominster, Mass.
Dejonge, Louis, & Co., New York
Dickinson, John, & Co., Hemel Hempstead, Herts., England
Driscoll, Frank H., Co., Winston-Salem, N. C.
Fitchburg Paper Co., Fitchburg, Mass.
Fitzhugh, William W., Inc., New York
Foil Products, Inc., Winston-Salem, N. C.
Frann Paper Corp., Brooklyn, N. Y.
Gardner-Neumann, Inc., Brooklyn, N. Y.
Green Bay Tissue Mills, Green Bay, Wis.
•Hartford City Paper Co., Hartford City, Ind.
Hazen Paper Co., Holyoke, Mass.
House of Harley, Inc., New York
Irvington Div., Minnesota Mining & Mfg. Co., Irvington, N. J.
•KVP Co., Kalamazoo, Mich.
Koehler, Karl, Assoc., Coopersburg, Pa.
Kupfer Bros. Co., New York
•Lachman-Novasel Paper Corp., New York
Lustour Corp., Clayton, Mo.
Marvellum Co., Holyoke, Mass.
•Matthias Paper Corp., Philadelphia
•Mead Corp., Dayton, Ohio
Middlesex Products Corp., Cambridge, Mass.
•Milprint, Inc., Milwaukee
Nashua Corp., Nashua, N. H.
New England Card & Paper Co., Springfield, Mass.
Oberly & Newell Lithograph Corp., New York
Orchard Paper Co., St. Louis, Mo.
Paper Converting & Finishing Co., Chicago
Phoenix Products Co., Milwaukee
Plastic Coating Corp., Holyoke, Mass.
Potlatch Forests, Inc., Pomona, Calif.
Price Bros. Lithograph Co., Bridgeton, N. J.
Printed Products, Inc., Memphis, Tenn.
Raisin, John T., Corp., San Francisco
Reading Glazed Paper Corp., Reading, Pa.
•Riegel Paper Corp., New York
Robinson, E. S. & A., (Canada) Ltd., Toronto, Ont.
Royal Paper Corp., New York
Schroeder, Arthur, Paper Co., New York
Simpliform Co., St. Louis, Mo.
Smith-Stewart Paper Products, Inc., Brooklyn, N. Y.
Southern Advance Bag & Paper Co., Boston
Specialty Papers Co., Dayton, Ohio
Strauss, Golman & Goldman Co., Dallas, Texas
Supreme Ribbon Corp., New York
•Sweetnam, George H., Inc., Cambridge, Mass.
Talmadge Printing Co., New York
•Thilmany Pulp & Paper Co., Kaukauna, Wis.
Trautmann, Bailey & Blampey, New York
Unger Paper Co., New York
Uni-Mark, Inc., Boston
United Wallpaper, Inc., Aurora, Ill.
Western Foil Co., Seattle, Wash.
Western Foil Converters, Berkeley, Calif.
•Westfield River Paper Co., Russell, Mass.
Whiting, C. R., Co., Hackensack, N. J.
Wrapture, Inc., Flushing, N. Y.
Wyomissing Glazed Paper Co., Reading, Pa.

PAPER, FLINT GLAZED

For editorial information, see Section 3

Canada Paper "Wholesale" Ltd., Toronto, Ont.
Dejonge, Louis, & Co., New York
Dickinson, John, & Co., Hemel Hempstead, Herts., England
Franc-Graham Paper Co., New York
Kupfer Bros. Co., New York
•Lachman-Novasel Paper Corp., New York
•Matthias Paper Corp., Philadelphia
Orchard Paper Co., St. Louis, Mo.
Reading Glazed Paper Corp., Reading, Pa.
Royal Paper Corp., New York
Supreme Ribbon Corp., New York
Unger Paper Co., New York
Whiting, C. R., Co., Hackensack, N. J.
Wyomissing Glazed Paper Co., Reading, Pa.

PAPER, FLUORESCENT

For editorial information, see Sections 3, 16

Avery Paper Co., Painesville, Ohio
•Crocker, Burbank Papers, Inc., Fitchburg, Mass.
•Kleen-Stik Products, Inc., Chicago
Kupfer Bros. Co., New York
•Matthias Paper Corp., Philadelphia
Orchard Paper Co., St. Louis, Mo.
Pyrotex Leather Co., Leominster, Mass.
Radiant Color Co., Oakland, Calif.
Royal Paper Corp., New York
Switzer Bros., Inc., Cleveland

PAPER, FOIL

For editorial information, see Section 4

Alufoil Products Co., New York
Aluminum Rolling Mills, Ltd., Cap-de-la-Madeleine, Que.
•Angier Corp., Framingham, Mass.
•Arvey Corp., Chicago
Bulkley, Dunton & Co., New York
Camotone, Inc., Mamaroneck, N. Y.
Camp Mfg. Co., Franklin, Va.
Chicago Printed String Co., Chicago
•Cochran Foil Co., Louisville, Ky.
Container Corp. of America, Traver Flexible Packaging Div., Chicago
Converter Corp., Leominster, Mass.
•Crocker, Burbank Papers, Inc., Fitchburg Mass.
Dejonge, Louis, & Co., New York
Dickinson, John, & Co., Hemel Hempstead, Herts., England
•Dobeckmun Co., Cleveland
Driscoll, Frank H., Co., Winston-Salem, N. C.
•Gummed Products Co., Troy, Ohio
•Hamersley Mfg. Co., Garfield, N. J.
Hazen Paper Co., Holyoke, Mass.
•KVP Co., Kalamazoo, Mich.
Kupfer Bros. Co., New York
•Lachman-Novasel Paper Corp., New York
•Matthias Paper Corp., Philadelphia
Middlesex Products Corp., Cambridge, Mass.
•Milprint, Inc., Milwaukee
Nashua Corp., Nashua, N. H.
National Foil Co., Elizabeth, N. J.
Newark Paraffine & Parchment Paper Co., Newark, N. J.
Orchard Paper Co., St. Louis, Mo.
Pacific Coast Foil Co., Div. Jorgenson & Co., San Francisco
Paperboard Laminating Corp., Norwalk, Conn.
Plastic Film Corp., Plainfield, Conn.
Protective Papers, Inc., Union, Ill.
Raisin, John T., Corp., San Francisco
•Reynolds Metals Co., Louisville, Ky.
Robinson, E. S. & A., (Canada) Ltd., Toronto, Ont.
Robinson Waxed Paper Co., Ltd., Bristol, England
Royal Paper Corp., New York
Shopsin Paper Co., New York
•Smith, H. P., Paper Co., Chicago
Smith-Stewart Paper Products, Inc., Brooklyn, N. Y.
Southland Paper Converting Co., Los Angeles
Specialty Paper Co., Dayton, Ohio
Standard Packaging Corp., General Felt Products Div., Brooklyn, N. Y.
Standard Rolling Mills, Brooklyn, N. Y.
Strauss, Golman & Goldman Co., Dallas, Texas
Taffel Bros., Inc., New York
•Thilmany Pulp & Paper Co., Kaukauna, Wis.
Unger Paper Co., New York
Waxide Paper Co., Kansas City, Mo.
Western Foil Co., Seattle, Wash.
Western Foil Converters, Berkeley, Calif.
•Western Waxed Paper Div., Crown Zellerbach Corp., San Leandro, Calif.
Whiting, C. R., Co., Hackensack, N. J.

PAPER, FRICTION GLAZED

For editorial information, see Section 3

Canada Glazed Papers, Ltd., Wexford, Ont.
Dejonge, Louis, & Co., New York
Kupfer Bros. Co., New York
•Lachman-Novasel Paper Corp., New York
Marvellum Co., Holyoke, Mass.
•Matthias Paper Corp., Philadelphia
Middlesex Products Corp., Cambridge, Mass.
New England Card & Paper Co., Springfield, Mass.
Orchard Paper Co., St. Louis, Mo.
Reading Glazed Paper Corp., Reading, Pa.
Royal Paper Corp., New York
•Thilmany Pulp & Paper Co., Kaukauna, Wis.
Unger Paper Co., New York
Whiting, C. R., Co., Hackensack, N. J.
Wyndmoor Mfg. Corp., Newark, N. J.
Wyomissing Glazed Paper Co., Reading, Pa.

PAPER, GLASSINE

(Waxed, Laminated & Lacquered)

For editorial information, see Section 3

Arkell Safety Bag Co., New York
•Arvey Corp., Chicago
Bowaters Sales Co. Ltd., London, England
Camotone, Inc., Mamaroneck, N. Y.
Canada Foils, Ltd., Toronto, Ont.
Canada Paper "Wholesale" Ltd., Toronto, Ont.
Central Waxed Paper Co., Chicago
Container Corp. of America, Traver Flexible Packaging Div., Chicago
•Continental Can Co., Shellmar-Betner Flexible Packaging Div., Mt. Vernon, Ohio
Daniels Mfg. Co., Rhinelander, Wis.
Deerfield Glassine Co., Monroe Bridge, Mass.
Dickinson, John, & Co., Hemel Hempstead, Herts., England
Dixie Wax Paper Co., Dallas, Texas
•Hamersley Mfg. Co., Garfield, N. J.
•Hartford City Paper Co., Hartford City, Ind.
Kupfer Bros. Co., New York
Marvellum Co., Holyoke, Mass.

•Matthias Paper Corp., Philadelphia
•Melrose Packaging, New York
•Milprint, Inc., Milwaukee
Newark Paraffine & Parchment Paper Co., Newark, N. J.
•Oneida Paper Products, Inc., Clifton, N. J.
Orchard Paper Co., St. Louis, Mo.
Phoenix Products Co., Milwaukee
Pollock Paper Corp., Div. St. Regis Paper Co., Dallas, Texas
Rapinwax Paper Co., Minneapolis
•Rhinelander Paper Co., Rhinelander, Wis.
•Riegel Paper Corp., New York
Robinson, E. S. & A., (Canada) Ltd., Toronto, Ont.
Robinson Waxed Paper Co., Ltd., Bristol, England
Royal Paper Corp., New York
St. Regis Paper Co., New York
Specialty Papers Co., Dayton, Ohio
Standard Packaging Corp., General Felt Products Div., Brooklyn, N. Y.
•Sweetnam, George H., Inc., Cambridge, Mass.
•Thilmany Pulp & Paper Co., Kaukauna, Wis.
Unger Paper Co., New York
Waxide Paper Co., Kansas City, Mo.
•Western Waxed Paper Div., Crown Zellerbach Corp., San Leandro, Calif.
•Westfield River Paper Co., Russell, Mass.

PAPER, GLASSINE & GREASEPROOF

(Plain & Embossed)

For editorial information, see Section 3

Bowaters Sales Co. Ltd., London, England
Camotone, Inc., Mamaroneck, N. Y.
Canada Foils Ltd., Toronto, Ont.
Canada Paper "Wholesale" Ltd., Toronto, Ont.
Central Waxed Paper Co., Chicago
Container Corp. of America, Traver Flexible Packaging Div., Chicago
•Continental Can Co., Shellmar-Betner Flexible Packaging Div., Mt. Vernon, Ohio
Daniels Mfg. Co., Rhinelander, Wis.
Deerfield Glassine Co., Monroe Bridge, Mass.
Dickinson, John, & Co., Hemel Hempstead, Herts., England
Dixie Wax Paper Co., Dallas, Texas
•Hamersley Mfg. Co., Garfield, N. J.
•Hartford City Paper Co., Hartford City, Ind.
Kupfer Bros. Co., New York
Marvellum Co., Holyoke, Mass.
•Matthias Paper Corp., Philadelphia
Murnane Paper Co., Chicago
•Oneida Paper Products, Inc., Clifton, N. J.
Orchard Paper Co., St. Louis, Mo.
Paterson Parchment Paper Co., Bristol, Pa.
Rapinwax Paper Co., Minneapolis
•Rhinelander Paper Co., Rhinelander, Wis.
•Riegel Paper Corp., New York
Royal Paper Corp., New York
Shawmut Waxed Paper Co., Holliston, Mass.
Standard Packaging Corp., General Felt Products Div., Brooklyn, N. Y.
•Sweetnam, George H., Inc., Cambridge, Mass.
•Thilmany Pulp & Paper Co., Kaukauna, Wis.
•Westfield River Paper Co., Russell, Mass.

PAPER, GUMMED

For editorial information, see Sections 5, 15

Atlantic Gummed Paper Corp., Brooklyn, N. Y.
Avery Paper Co., Painesville, Ohio
Brown-Bridge Mills, Inc., Troy, Ohio
Camp Mfg. Co., Richmond, Va.
Canada Paper "Wholesale" Ltd., Toronto, Ont.
•Dennison Mfg. Co., Framingham, Mass.
Dickinson, John, & Co., Hemel Hempstead, Herts., England
Franc-Graham Paper Co., New York
•Gummed Products Co., Troy, Ohio
Gummed Tape & Devices Co., Brooklyn, N. Y.
Hudson Pulp & Paper Corp., New York
Kupfer Bros. Co., New York
Label-Rite Co., Weston, Ont.
Lithographers Finishing Co., New York
•Matthias Paper Corp., Philadelphia
McLaurin-Jones Co., Brookfield, Mass.
Mid-States Gummed Paper Co., Chicago
Murnane Paper Co., Chicago
Nashua Corp., Nashua, N. H.
Paper Converting & Finishing Co., Chicago
Paper Manufacturers Co., Philadelphia
Royal Paper Corp., New York
St. Regis Paper Co., New York
Simpliform Co., St. Louis, Mo.
Spear Box Co., New York
Stocker Manufacturing Co., Netcong, N. J.
Thomas Stationery Mfg. Co., Springfield, Ohio
Van Cleef Bros., Inc., Div. Johns-Manville, Chicago

PAPER, HEAT SEALING

For editorial information, see Section 3

•Arvey Corp., Chicago
Brown-Bridge Mills, Inc., Troy, Ohio
Camotone, Inc., Mamaroneck, N. Y.
Canada Glazed Papers, Ltd., Wexford, Ont.
Central Waxed Paper Co., Chicago
•Champion Paper & Fiber Co., Hamilton, Ohio
Cincinnati Industries, Inc., Cincinnati
Cotswold Fibres, Inc., Columbus, Ga.
Crystal Tissue Co., Middletown, Ohio
•Dennison Mfg. Co., Framingham, Mass.
Dixie Wax Paper Co., Dallas, Texas
•Fibleco Illinois Corp., Chicago
Franc-Graham Paper Co., New York
Guardian Paper Co., Oakland, Calif.
•Gummed Products Co., Troy, Ohio
Hazen Paper Co., Holyoke, Mass.
Heat Seal Label Co., New York
•KVP Co., Kalamazoo, Mich.
Kupfer Bros. Co., New York
Label-Rite Co., Weston, Ont.
Lithographers Finishing Co., New York
Marvellum Co., Holyoke, Mass.
McLaurin-Jones Co., Brookfield, Mass.
•Mead Corp., Dayton, Ohio
Mid-States Gummed Paper Co., Chicago
Nashua Corp., Nashua, N. H.
Newark Paraffine & Parchment Paper Co., Newark, N. J.
•Oneida Paper Products, Inc., Clifton, N. J.
Pacific Coast Foil Co., Div. Jorgenson & Co., San Francisco
Paper Converting & Finishing Co., Chicago
Paper Manufacturers Co., Philadelphia
Plastic Coating Corp., Holyoke, Mass.
Pyrotex Leather Co., Leominster, Mass.
•Pyroxylin Products, Inc., Chicago
Rapinwax Paper Co., Minneapolis
•Rhinelander Paper Co., Rhinelander, Wis.
•Riegel Paper Corp., New York
Robinson, E. S. & A., (Canada) Ltd., Toronto, Ont.
Robinson Waxed Paper Co., Ltd., Bristol, England
Royal Paper Corp., New York
Shawmut Waxed Paper Co., Holliston, Mass.
Shopsin Paper Co., New York
•Smith, H. P., Paper Co., Chicago
Specialty Papers Co., Dayton, Ohio
Waxide Paper Co., Kansas City, Mo.
Western Foil Converters, Berkeley, Calif.
•Western Waxed Paper Div., Crown Zellerbach Corp., San Leandro, Calif.
Wyndmoor Mfg. Corp., Newark, N. J.

PAPER, IMITATION FOIL

For editorial information, see Sections 3, 16

•Arvey Corp., Chicago
Camotone, Inc., Mamaroneck, N. Y.
Dejonge, Louis, & Co., New York
Dickinson, John, & Co., Hemel Hempstead, Herts., England
Driscoll, Frank H., Co., Winston-Salem, N. C.
Hazen Paper Co., Holyoke, Mass.
Kupfer Bros., Inc., New York
•Lachman-Novasel Paper Corp., New York
•Matthias Paper Corp., Philadelphia
Middlesex Products Corp., Cambridge, Mass.
Orchard Paper Co., St. Louis, Mo.
Paper Converting & Finishing Co., Chicago
•Riegel Paper Corp., New York
Smith-Stewart Paper Products, Inc., Brooklyn, N. Y.
Specialty Papers Co., Dayton, Ohio
Unger Paper Co., New York
•Warren, S. D., Co., Boston
Wyomissing Glazed Paper Co., Reading, Pa.

PAPER, IMPREGNATED

For editorial information, see Section 3

•Angier Corp., Framingham, Mass.
Arkell Safety Bag Co., New York
•Arvey Corp., Chicago
COSECO, Los Angeles
Camotone, Inc., Mamaroneck, N. Y.
Camp Mfg. Co., Franklin, Va.
Central States Paper & Bag Co., St. Louis, Mo.
Central Waxed Paper Co., Chicago
Cincinnati Industries, Inc., Cincinnati
Collison, Lee & Philippi, Inc., Cincinnati
Continental Can Co., Crown & Cork Div., Wilmington, Del.
•Crocker, Burbank Papers, Inc., Fitchburg, Mass.
•Cromwell Paper Co., Chicago
Crystal Tissue Co., Middletown, Ohio
Electro-Technical Products, Div. Sun Chemical Corp., Nutley, N. J.
Endura Corp., Quakertown, Pa.
•KVP Co., Kalamazoo, Mich.
Kupfer Bros. Co., New York
•Mead Corp., Dayton, Ohio
•Melrose Packaging, New York
National Waterproof Papers, Inc., Beverly, N. J.
Nichols Paper Products Co., Green Bay, Wis.
Orchard Paper Co., St. Louis, Mo.
Paper Converting & Finishing Co., Chicago
Plastic Coating Corp., Holyoke, Mass.
Potlatch Forests, Inc., Pomona, Calif.
Protective Papers, Inc., Union, Ill.
•Riegel Paper Corp., New York
Robinson, E. S. & A., (Canada) Ltd., Toronto, Ont.
Robinson Waxed Paper Co., Ltd., Bristol, England
Ruberoid Co., New York
St. Regis Paper Co., New York
Southland Paper Converting Co., Los Angeles
Standard Insulation Co., East Rutherford, N. J.
Standard Packaging Corp., General Felt Products Div., Brooklyn, N. Y.
Uni-Mark, Inc., Boston

PAPER, KRAFT

For editorial information, see Section 3

Arkell Safety Bag Co., New York
Bowaters Sales Co., London, England
Brown Co., Boston
Camotone, Inc., Mamaroneck, N. Y.
Camp Mfg. Co., Franklin, Va.

Canada Paper "Wholesale" Ltd., Toronto, Ont.
•Champion Paper & Fiber Co., Hamilton, Ohio
Chase Bag Co., Chicago
Chesapeake Corp. of Virginia, West Point, Va.
Cincinnati Industries, Inc., Cincinnati
Collison, Lee & Philippi, Inc., Cincinnati
•Crocker, Burbank Papers, Inc., Fitchburg, Mass.
Crystal Tissue Co., Middletown, Ohio
Dixie Wax Paper Co., Dallas, Texas
East Texas Pulp & Paper Co., Silsbee, Texas
•Gaylord Container Corp., St. Louis, Mo.
Green Bay Tissue Mills, Green Bay, Wis.
Hudson Pulp & Paper Corp., New York
•National Container Corp., New York
•Oneida Paper Products, Inc., Clifton, N. J.
Orchard Paper Co., St. Louis, Mo.
Paterson Parchment Paper Co., Bristol, Pa.
Potlatch Forests, Inc., Pomona, Calif.
Rapinwax Paper Co., Minneapolis
Robinson Waxed Paper Co., Bristol, England
St. Regis Paper Co., New York
Shawmut Waxed Paper Co., Holliston, Mass.
Smith-Stewart Paper Products, Inc., Brooklyn, N. Y.
Southern Advance Bag & Paper Co., Boston
•Thilmany Pulp & Paper Co., Kaukauna, Wis.
•West Virginia Pulp & Paper Co., New York
•Western Waxed Paper Div., Crown Zellerbach Corp., San Leandro, Calif.

PAPER, LAMINATED

For editorial information, see Sections 3, 4

•Acme Backing Corp., Stamford, Conn.
American Sisalkraft Corp., Attleboro, Mass.
•Angier Corp., Framingham, Mass.
Arkell Safety Bag Co., New York
•Arvey Corp., Chicago
Atlantic Gummed Paper Corp., Brooklyn, N. Y.
COSECO, Los Angeles
Camotone, Inc., Mamaroneck, N. Y.
Camp Mfg. Co., Franklin, Va.
Central Waxed Paper Co., Chicago
Chase Bag Co., Chicago
•Chester Packaging Products Corp., Yonkers, N. Y.
Cincinnati Industries, Inc., Cincinnati
•Cochran Foil Co., Louisville, Ky.
Collison, Lee & Philippi, Inc., Cincinnati
•Continental Can Co., Shellmar-Betner Flexible Packaging Div., Mt. Vernon, Ohio
Converter Corp., Leominster, Mass.
Cotswold Fibres, Inc., Columbus, Ga.
•Crocker, Burbank Papers, Inc., Fitchburg, Mass.
•Cromwell Paper Co., Chicago
Dejonge, Louis, & Co., New York
Dickinson, John, & Co., Hemel Hempstead, Herts., England
Dixie Wax Paper Co., Dallas, Texas
•Dobeckmun Co., Cleveland
Driscoll, Frank H., Co., Winston-Salem, N. C.
Electro-Technical Products, Div. Sun Chemical Corp., Nutley, N. J.
Emeloid Co., Hillside, N. J.
•Fibleco Illinois Corp., Chicago
•Fisher's Foils Ltd., Wembley, Middx., England
Fulton Bag & Cotton Mills, Atlanta, Ga.
•Gaylord Container Corp., St. Louis, Mo.
Grand City Container Corp., No. Bergen, N. J.
Guardian Paper Co., Oakland, Calif.
•Hamersley Mfg. Co., Garfield, N. J.
International Paper Co., Bagpak Div., New York
Irvington Div., Minnesota Mining & Mfg. Co., Irvington, N. J.
•KVP Co., Kalamazoo, Mich.
Kieffer Paper Mills, Ewing, Ind.
Kupfer Bros. Co., New York
Marvellum Co., Holyoke, Mass.
•Matthias Paper Corp., Philadelphia
•Melrose Packaging, New York
Mor-Gan Laminating & Foliating Co., New York
Mountain Waterproof Papers, Inc., Worcester, Mass.
National Foil Co., Elizabeth, N. J.
National Waterproof Papers, Inc., Beverly, N. J.
Newark Paraffine & Parchment Paper Co., Newark, N. J.
Orchard Paper Co., St. Louis, Mo.
Pacific Coast Foil Co., Div. Jorgenson & Co., San Francisco
Paper Converting & Finishing Co., Chicago
Protective Papers, Inc., Union, Ill.
Raisin, John T., Corp., San Francisco
•Rhinelander Paper Co., Rhinelander, Wis.
•Riegel Paper Corp., New York
Robinson, E. S. & A., (Canada) Ltd., Toronto, Ont.
Robinson Waxed Paper Co., Bristol, England
Ruberoid Co., New York
St. Regis Paper Co., New York
Shopsin Paper Co., New York
•Smith, H. P., Paper Co., Chicago
Southland Paper Converting Co., Los Angeles
Specialty Papers Co., Dayton, Ohio
Standard Insulation Co., East Rutherford, N. J.
Standard Packaging Corp., General Felt Products Div., Brooklyn, N. Y.
•Sweetnam, George H., Inc., Cambridge, Mass.
•Thilmany Pulp & Paper Co., Kaukauna, Wis.
Unger Paper Co., New York
Western Foil Converters, Berkeley, Calif.
•Western Waxed Paper Div., Crown Zellerbach Corp., San Leandro, Calif.
•Westfield River Paper Co., Russell, Mass.
Wyndmoor Mfg. Corp., Newark, N. J.
Wyomissing Glazed Paper Co., Reading, Pa.

PAPER, MOLD-INHIBITING

For editorial information, see Section 3

•Crocker, Burbank Papers, Inc., Fitchburg, Mass.
•Cromwell Paper Co., Chicago
•KVP Co., Kalamazoo, Mich.
Kupfer Bros. Co., New York
•Matthias Paper Corp., Philadelphia
McLaurin-Jones Co., Brookfield, Mass.
Paper Converting & Finishing Co., Chicago
Reading Glazed Paper Corp., Reading, Pa.
•Rhinelander Paper Co., Rhinelander, Wis.
•Riegel Paper Corp., New York
Robinson, E. S. & A., (Canada) Ltd., Toronto, Ont.
Ruberoid Co., New York
St. Regis Paper Co., New York
Specialty Papers Co., Dayton, Ohio
•Thilmany Pulp & Paper Co., Kaukauna, Wis.
•Warren, S. D., Co., Boston
Wyomissing Glazed Paper Co., Reading, Pa.

PAPER, TISSUE

(Plain & Fancy)

For editorial information, see Section 3

Brooks Paper Co., St. Louis, Mo.
Camotone, Inc., Mamaroneck, N. Y.
Canada Foils, Ltd., Toronto, Ont.
Crystal Tissue Co., Middletown, Ohio
•Dennison Mfg. Co., Framingham, Mass.
•Dobeckmun Co., Cleveland
Erving Paper Mills, Erving, Mass.
Green Bay Tissue Mills, Green Bay, Wis.
•Hamersley Mfg. Co., Garfield, N. J.
Kupfer Bros. Co., New York
Marvellum Co., Holyoke, Mass.
•Matthias Paper Corp., Philadelphia
Orchard Paper Co., St. Louis, Mo.
Phoenix Products Co., Milwaukee
Potlatch Forests, Inc., Pomona, Calif.
Royal Paper Corp., New York
Schroeder, Arthur, Paper Co., New York
Shawano Paper Mills, Shawano, Wis.
Shawmut Waxed Paper Co., Holliston, Mass.
Smith-Stewart Paper Products, Inc., Brooklyn, N. Y.
•Thilmany Pulp & Paper Co., Kaukauna, Wis.
Twitchell, E. W., Inc., Packaging Div., Philadelphia
•Western Waxed Paper Div., Crown Zellerbach Corp., San Leandro, Calif.

PAPER, TRADEMARKED

For editorial information, see Section 3

Anderson, George W., Inc., Long Island City, N. Y.
Camotone, Inc., Mamaroneck, N. Y.
Codd Paper Co., New York
Converter Corp., Leominster, Mass.
Dejonge, Louis, & Co., New York
Franc-Graham Paper Co., New York
Hazen Paper Co., Holyoke, Mass.
Kupfer Bros. Co., New York
•Lachman-Novasel Paper Corp., New York
Marvellum Co., Holyoke, Mass.
•Matthias Paper Corp., Philadelphia
•Mead Corp., Dayton, Ohio
Nashua Corp., Nashua, N. H.
Orchard Paper Co., St. Louis, Mo.
Oxford Paper Co., New York
Raisin, John T., Corp., San Francisco
Royal Paper Corp., New York
Schroeder, Arthur, Paper Co., New York
Shawano Paper Mills, Shawano, Wis.
•Sweetnam, George H., Inc., Cambridge, Mass.
•Thilmany Pulp & Paper Co., Kaukauna, Wis.
Whiting, C. R., Co., Hackensack, N. J.
Wrapture, Inc., Flushing, N. Y.
Wyomissing Glazed Paper Co., Reading Pa.

PAPER, VEGETABLE PARCHMENT

For editorial information, see Section 3

•KVP Co., Kalamazoo, Mich.
•Matthias Paper Corp., Philadelphia
Paterson Parchment Paper Co., Bristol, Pa.
West Carrollton Parchment Co., West Carrollton, Ohio

PAPER, VELOUR

(Plain, Printed, Embossed)

For editorial information, see Section 16

Bulkley, Dunton & Co., New York
Camotone, Inc., Mamaroneck, N. Y.
Dejonge, Louis, & Co., New York
Frankel Assoc., Inc., New York
Kupfer Bros. Co., New York
•Lachman-Novasel Paper Corp., New York
Maharam Fabric Corp., New York
•Matthias Paper Corp., Philadelphia
•Mead Corp., Dayton, Ohio
Nashua Corp., Nashua, N. H.
Orchard Paper Co., St. Louis, Mo.
Royal Paper Corp., New York
Talmadge Printing Co., New York
Unger Paper Co., New York
Velvetone Finishing Corp., Long Island City, N. Y.

PAPER, VOLATILE CORROSION INHIBITING

For editorial information, see Section 3

•Angier Corp., Framingham, Mass.
•Arvey Corp., Chicago
Camp Mfg. Co., Franklin, Va.
Canada Glazed Papers, Ltd., Wexford, Ont.
Central Ohio Paper Co., Columbus, Ohio
Cotswold Fibres, Inc., Columbus, Ga.
•Crocker, Burbank Papers, Inc., Fitchburg, Mass.
•Cromwell Paper Co., Chicago
Excello Paper Products, Cincinnati
•Hamersley Mfg. Co., Garfield, N. J.
•KVP Co., Kalamazoo, Mich.
Marvellum Co., Holyoke, Mass.
•Matthias Paper Corp., Philadelphia
Miami Valley Coated Paper Co., Franklin, Ohio
Mid-West Waxed Paper Co., Fort Madison, Iowa
Nox-Rust Div., Daubert Chemical Co., Chicago
Orchard Paper Co., St. Louis, Mo.
Paper Converting & Finishing Co., Chicago
Rapinwax Paper Co., Minneapolis
Robinson, E. S. & A., (Canada) Ltd., Toronto, Ont.
Sherman Paper Products Corp., Newton, Mass.
•Thilmany Pulp & Paper Co., Kaukauna, Wis.
Wyndmoor Mfg. Corp., Newark, N. J.

PAPER, WATERPROOF

For editorial information, see Section 3

American Sisalkraft Corp., Attleboro, Mass.
•Angier Corp., Framingham, Mass.
Arkell Safety Bag Co., New York
•Arvey Corp., Chicago
Behr-Manning, Troy, N. Y.
COSECO, Los Angeles
Canada Glazed Papers, Ltd., Wexford, Ont.
Central States Paper & Bag Co., St. Louis, Mo.
Central Waxed Paper Co., Chicago
Chase Bag Co., Chicago
Cincinnati Industries, Inc., Cincinnati
Cotswold Fibres, Inc., Columbus, Ga.
•Crocker, Burbank Papers, Inc., Fitchburg, Mass.
•Cromwell Paper Co., Chicago
Dejonge, Louis, & Co., New York
•Fibleco Illinois Corp., Chicago
Fulton Bag & Cotton Mills, Atlanta, Ga.
Hazen Paper Co., Holyoke, Mass.
•KVP Co., Kalamazoo, Mich.
Kupfer Bros. Co., New York
•Lowe Paper Co., Ridgefield, N. J.
•Matthias Paper Corp., Philadelphia
•Mead Corp., Dayton, Ohio
Mountain Waterproof Papers, Inc., Worcester, Mass.
Murnane Paper Co., Chicago
National Waterproof Papers, Inc., Beverly, N. J.
Orchard Paper Co., St. Louis, Mo.
Papyrus Co., Kenilworth, N. J.
Plastic Coating Corp., Holyoke, Mass.
Protective Coatings Corp., Atlas Package & Container Corp. Div., Clifton, N. J.
Protective Papers, Inc., Union, Ill.
Reading Glazed Paper Corp., Reading, Pa.
Robinson Waxed Paper Co., Bristol, England
Royal Paper Corp., New York
Ruberoid Co., New York
St. Regis Paper Co., New York
•Smith, H. P., Paper Co., Chicago
Southland Paper Converting Co., Los Angeles
Specialty Converters, Inc., East Braintree, Mass.
Specialty Papers Co., Dayton, Ohio
Stocker Manufacturing Co., Netcong, N. J.
•Thilmany Pulp & Paper Co., Kaukauna, Wis.
Union Bag & Paper Corp., New York
Vanant Products, Tomah, Wis.
•Western Waxed Paper Div., Crown Zellerbach Corp., San Leandro, Calif.
Whiting, C. R., Co., Hackensack, N. J.

PAPER, WATER-VAPOR RESISTANT

For editorial information, see Section 3

American Sisalkraft Corp., Attleboro, Mass.
•Angier Corp., Framingham, Mass.
Arundel Coating Corp., Baltimore, Md.
•Arvey Corp., Chicago
Blossom Mfg. Co., New York
Canada Glazed Papers, Ltd., Wexford, Ont.
Central States Paper & Bag Co., St. Louis, Mo.
Chase Bag Co., Chicago
Cincinnati Industries, Inc., Cincinnati
Cotswold Fibres, Inc., Columbus, Ga.
•Crocker, Burbank Papers, Inc., Fitchburg, Mass.
•Cromwell Paper Co., Chicago
Dixie Wax Paper Co., Dallas, Texas
Electro-Technical Products, Div. Sun Chemical Corp., Nutley, N. J.
•Hamersley Mfg. Co., Garfield, N. J.
International Paper Co., New York
•KVP Co., Kalamazoo, Mich.
Kupfer Bros. Co., New York
•Lowe Paper Co., Ridgefield, N. J.
Marvellum Co., Holyoke, Mass.
McLaurin-Jones Co., Brookfield, Mass.
•Melrose Packaging, New York
Murnane Paper Co., Chicago
Orchard Paper Co., St. Louis, Mo.
Paper Converting & Finishing Co., Chicago
Paterson Parchment Paper Co., Bristol, Pa.
Print-A-Tube Co., Rochelle Park, N. J.
Protective Papers, Inc., Union, Ill.
Pyrotex Leather Co., Leominster, Mass.
•Rhinelander Paper Co., Rhinelander, Wis.
•Riegel Paper Corp., New York
Robinson, E. S. & A., (Canada) Ltd., Toronto, Ont.
Ruberoid Co., New York
•Smith, H. P., Paper Co., Chicago
Specialty Paper Co., Dayton, Ohio
Stocker Mfg. Co., Netcong, N. J.
•Thilmany Pulp & Paper Co., Kaukauna, Wis.
Vanant Products, Tomah, Wis.
•Western Waxed Paper Div., Crown Zellerbach Corp., San Leandro, Calif.
•Westfield River Paper Co., Russell, Mass.

PAPER, WAXED

For editorial information, see Section 3

Arkell Safety Bag Co., New York
•Arvey Corp., Chicago
Bowaters Sales Co., London, England
Camotone, Inc., Mamaroneck, N. Y.
Camp Mfg. Co., Franklin, Va.
Central States Paper & Bag Co., St. Louis, Mo.
Central Waxed Paper Co., Chicago
Cincinnati Industries, Inc., Cincinnati
•Cromwell Paper Co., Chicago
Crystal Tissue Co., Middletown, Ohio
Dickinson, John, & Co., Hemel Hempstead, Herts., England
Dixie Wax Paper Co., Dallas, Texas
Electro-Technical Products, Div. Sun Chemical Corp., Nutley, N. J.
Erving Paper Mills, Erving, Mass.
General Waxed Papers, Inc., Chicago
Green Bay Tissue Mills, Green Bay, Wis.
•Hamersley Mfg. Co., Garfield, N. J.
•KVP Co., Kalamazoo, Mich.
•Marathon Corp., Menasha, Wis.
•Matthias Paper Corp., Philadelphia
•Mead Corp., Dayton, Ohio
Nashua Corp., Nashua, N. H.
Newark Paraffine & Parchment Paper Co., Newark, N. J.
Nichols Paper Products Co., Green Bay, Wis.
•Oneida Paper Products, Inc., Clifton, N. J.
Orchard Paper Co., St. Louis, Mo.
Paterson Parchment Paper Co., Bristol, Pa.
Pollock Paper Corp., Div. St. Regis Paper Co., Dallas, Texas
Port Huron Sulphite & Paper Co., Port Huron, Mich.
Potlatch Forests, Inc., Pomona, Calif.
Rapinwax Paper Co., Minneapolis
•Riegel Paper Corp., New York
Robinson, E. S. & A., (Canada) Ltd., Toronto, Ont.
Robinson Waxed Paper Co., Bristol, England
Shawmut Waxed Paper Co., Holliston, Mass.
•Smith, H. P., Paper Co., Chicago
Specialty Papers Co., Dayton, Ohio
•Sweetnam, George H., Inc., Cambridge, Mass.
•Thilmany Pulp & Paper Co., Kaukauna, Wis.
Waxide Paper Co., Kansas City, Mo.
West Carrollton Parchment Co., West Carrollton, Ohio
•Western Waxed Paper Div., Crown Zellerbach Corp., San Leandro, Calif.
•Westfield River Paper Co., Russell, Mass.

PAPER, WET STRENGTH

For editorial information, see Section 3

Aldine Paper Co., New York
American Sisalkraft Corp., Attleboro, Mass.
Arkell Safety Bag Co., New York
Bowaters Sales Co., London, England
Brown Co., Boston
Camotone, Inc., Mamaroneck, N. Y.
Camp Mfg. Co., Franklin, Va.
Chase Bag Co., Chicago
Cincinnati Industries, Inc., Cincinnati
•Crocker, Burbank Papers, Inc., Fitchburg, Mass.
Crystal Tissue Co., Middletown, Ohio
Daniels Mfg. Co., Rhinelander, Wis.
Dixie Wax Paper Co., Dallas, Texas
East Texas Pulp & Paper Co., Silsbee, Texas
•Fibleco Illinois Corp., Chicago
Fitchburg Paper Co., Fitchburg, Mass.
Franc-Graham Paper Co., New York
Green Bay Tissue Mills, Green Bay, Wis.
•Hartford City Paper Co., Hartford City, Ind.
•KVP Co., Kalamazoo, Mich.
•Matthias Paper Corp., Philadelphia
Oxford Paper Co., New York
Paterson Parchment Paper Co., Bristol, Pa.
Port Huron Sulphite & Paper Co., Port Huron, Mich.
Potlatch Forests, Inc., Pomona, Calif.
•Rhinelander Paper Co., Rhinelander, Wis.
•Riegel Paper Corp., New York
Royal Paper Corp., New York
St. Regis Paper Co., New York
Shawano Paper Mills, Shawano, Wis.
•Smith, H. P., Paper Co., Chicago
Southern Advance Bag & Paper Co., Boston
Specialty Papers Co., Dayton, Ohio
•Thilmany Pulp & Paper Co., Kaukauna, Wis.
•Warren, S. D., Co., Boston
•Western Waxed Paper Div., Crown Zellerbach Corp., San Leandro, Calif.
•Westfield River Paper Co., Russell, Mass.

PAPERBOARD

(See Boxboard)

PARTITIONS

For editorial information, see Section 18

Abana Products, Inc., Chicago
Acme Partition Co., Newark, N. J.
American Partition Co., Milwaukee
Bay Cities Paperbox Co., Oakland, Calif.
Bestpak, Inc., Natick, Mass.
Bradford, W. J., Paper Co., Chicago
Central Paper Box Co., Lancaster, Pa.
Container Corp. of America, Chicago
Fibre Partitions, Inc., Peoria, Ill.
General Carton Co., Cleveland
Gleason Industries, Culver City, Calif.
Gould, Stephen, Paper Co., Jersey City, N. J.
•Hinde & Dauch, Sandusky, Ohio
Henry, Ira L., Co., Watertown, Wis.
•Indianapolis Paper Container Corp., Indianapolis
Krafco Container Corp., Dallas, Texas
Kress, F. J., Co., Pittsburgh
Malanco, Inc., Blue Island, Ill.
Minnesota Filler Co., Minneapolis
Murnane Paper Co., Chicago
New Jersey Partition & Box Co., Newark, N. J.
•Peter Partition Corp., Brooklyn, N. Y.
Rapid Cutting Co., Brooklyn, N. Y.
•Richardson Taylor-Globe Corp., Cincinnati
River Raisin Paper Co., Monroe, Mich.
•Rondo American Corp., Hamden, Conn.
Spitzer Paper Box Co., Toledo, Ohio
•Sweetnam, George H., Inc., Cambridge, Mass.
United Paper Box Corp., Chicago
Upson Co., Lockport, N. Y.
Wabash Fibre Box Co., Terre Haute, Ind.
Zumbiel Co., Cincinnati

PASTES

(See Adhesives)

PICTURES

(For Box Tops)

For editorial information, see Section 6

•Bleier, Milton A., Corp., New York
•Cameo Die & Label Co., New York
Donald Art Co., Mamaroneck, N. Y.
Ketterlinus Litho. Mfg. Co., Primos, Pa.
Koehler, Karl, Assoc., Coopersburg, Pa.
Plaxall, Inc., Long Island City, N. Y.

PLASTIC FILMS

(See Transparent Films, Plastic)

PLASTIC MOLDING MATERIALS

A. *Acrylics*
B. *Cellulose Acetate*
C. *Cellulose Acetate Butyrate*
D. *Melamine*
E. *Phenolic*
F. *Polyethylene*
G. *Polystyrene*
H. *Urea*

For editorial information, see Section 8

•American Cyanamid Co., Plastics & Resins Div., New York (D, H)
American Molding Powder & Chemical Corp., Brooklyn, N. Y. (A, B, F, G)
•Bakelite Co., Div. Union Carbide & Carbon Corp., New York (E, F, G)
Bamberger, A., Corp., Brooklyn, N. Y. (A, B, F, G)
Barrett Div. Allied Chemical & Dye Corp., New York (D, H)
Catalin Corp. of America, New York (G)
•Celanese Corp. of America, New York (B)
•Davis, Joseph, Plastics Co., Arlington, N. J. (B)
Dow Chemical Co., Midland, Mich. (G)
•du Pont de Nemours, E. I., & Co., Wilmington, Del. (A, B, F)
Durez Plastics & Chemicals, Inc., No. Tonawanda, N. Y. (E)
Eastman Chemical Products, Inc., Kingsport, Tenn. (B, C, F)
Firestone Tire & Rubber Co., Plastics Div., Pottstown, Pa. (G)
Foster-Grant Co., Leominster, Mass. (F)
General Electric Co., Chemical & Metallurgical Div., St. Louis, Mo. (E)
•Gering Products, Inc., Kenilworth, N. J. (A, B, F, G)
Imperial Chemical Industries Ltd., Plastics Div., Welwyn Garden, Herts., England (A, E, F, H)
Keyes Fibre Sales Corp., New York (E)
Koppers Co., Pittsburgh (F, G)
•Monsanto Chemical Co., Springfield, Mass. (B, D, E, F, G)
Phillips Chemical Co., Sub. Phillips Petroleum Co., Bartlesville, Okla. (F)
Reilly Tar & Chemical Corp., Indianapolis (E)
Rohm & Haas Co., Philadelphia (A)
Spencer Chemical Co., Kansas City, Mo. (F)
Sylvan Plastics, Inc., New York (H)
U. S. Industrial Chemicals Co., Div. National Distillers Products Corp., New York (F)
U. S. Rubber Co., New York (H)
Watertown Mfg. Co., Watertown, Conn. (E)
Westchester Plastics, Inc., Mamaroneck, N. Y. (A, B, F, G)

PLASTIC SHEET (RIGID)

A. *Acetate*
B. *Butyrate*
C. *Modified Styrene*
D. *Polystyrene*
E. *Vinyls*

For editorial information, see Section 8

American Kleer-Vu Plastics, Inc., Maspeth, N. Y. (A)
American Products Mfg. Co., New Orleans, La. (A)
Anorgana G.M.B.H., Gendorf/Obb., Germany (E)
•Auburn Button Works, Inc., Auburn, N.Y. (A, C)
•Bakelite Co., Div. Union Carbide & Carbon Corp., New York (E)
Bamberger, A., Corp., Brooklyn, N. Y. (A, C, D, E)
Bolta Products, Div. General Tire & Rubber Co., Lawrence, Mass. (C, E)
British Cellophane, Ltd., London, England (A, E)
Campco Div., Chicago Molded Products Corp., Chicago (C)
•Celanese Corp. of America, New York (A)
Columbus Coated Fabrics Corp., Columbus, Ohio (E)
Craftint Mfg. Co., Cleveland (A)
Crook, William A., Watertown, Mass. (A, C, D, E)
Crystal-X Corp., Lenni Mills, Pa. (A, C, D, E)
Davidson Products Co., Seattle, Wash. (D)
•Davis, Joseph, Plastics Co., Arlington, N. J. (A, C, D)
Dow Chemical Co., Midland, Mich. (C)
•du Pont de Nemours, E. I., & Co., Wilmington, Del. (A)
•Eastman Kodak Co., Rochester, N. Y. (A, B)
Elm Coated Fabrics Co., New York (E)
Firestone Tire & Rubber Co., Plastics Div., Pottstown, Pa. (E)
Foam King, Inc., Bronx, N. Y. (E)
Freedman, Leonard, & Sons, New York (E)
•Gering Products, Inc., Kenilworth, N. J. (A, C, D)
Gilman Bros. Co., Gilman, Conn. (A, D)
Hedwin Corp., Baltimore, Md. (A, C, D, E)
Holland Insulated Wire & Cable Works, Ltd., Amsterdam, Holland (E)
Imperial Chemical Industries Ltd., Plastics Div., Welwyn Garden, Herts., England (E)
Lurie Plastics, Inc., Colonial Heights, Va. (A, C, D, E)
Midwest Plastic Products Co., Chicago Heights, Ill. (A, C, D)
•Monsanto Chemical Co., Springfield, Mass. (A)
Nixon Nitration Works, Nixon, N. J. (A, D, E)
•Plax Corp., West Hartford, Conn. (D)
St. Regis Paper Co., Panelyte Div., New York (C, D)
Sandee Mfg. Co., Chicago (A, C, D)
Sillcocks-Miller Co., Maplewood, N. J. (A, C, D, E)
Southern Plastics Co., Columbia, S. C. (A, C, D, E)
Transilwrap Co., Chicago (A, C, D, E)
U. S. Rubber Co., New York (C, E)
Westlake Plastics Co., Lenni Mills, Pa. (C, D)

PLASTICIZERS

For editorial information, see Section 4

•Celanese Corp. of America, New York
•Dewey & Almy Chemical Co., Div. W. R. Grace & Co., Cambridge, Mass.
Dow Chemical Co., Midland, Mich.
•du Pont de Nemours, E. I., & Co., Wilmington, Del.
Eastman Chemical Products, Kingsport, Tenn.
Goodrich, B. F., Chemical Co., Cleveland
•Monsanto Chemical Co., St. Louis, Mo.
•Pfizer, Chas., & Co., Brooklyn, N. Y.
U. S. Industrial Chemicals Co., Div. National Distillers Products Corp., New York

PLUGS, DRUM, METAL

For editorial information, see Section 17

•American Flange & Mfg. Co., New York
Van Leer's Vatenfabrieken N.V., Amsterdam, Holland

PLUGS, PAIL, METAL

For editorial information, see Section 18

•American Flange & Mfg. Co., New York
Van Leer's Vatenfabrieken N.V., Amsterdam, Holland

PLYWOOD

For editorial information, see Section 17

Atlas Plywood Corp., Boston
Martin Bros. Box Co., Toledo, Ohio
•Owens-Illinois Glass Co., Toledo, Ohio
South Bend Box Co., Div. General Building Materials, Inc., South Bend, Ind.
Tell City Furniture Co., Chicago
Timber Products Co., Medford, Ore.
United States Plywood Corp., New York

PROPELLENTS, AEROSOL

For editorial information, see Section 9

•du Pont de Nemours, E. I., & Co., Wilmington, Del.
•General Chemical Div., Allied Chemical & Dye Corp., New York

RIBBONS & TIES

A. *Film, Plastic, Etc.*
B. *Paper*
C. *Textile*
D. *Tinsel*

For editorial information, see Section 16

Arbetter Ribbon & Mfg. Co., Chicago (A, C, D)
Artistic Flower Co., New York (C, D)
Blossom Mfg. Co., New York (A)
Buser, R. G., Silk Corp., Paterson, N. J. (C, D)
Cardinal Mills, Inc., Glen Cove, N. Y. (A, C)
Chicago Printed String Co., Chicago (C)
Dubelier Braid Co., New York (A, C)
Elm Coated Fabrics Co., New York (A)
Feder Industries, Inc., New York (A, B, C, D)
General Printed String Co., Milwaukee (C)
•Gering Products, Inc., Kenilworth, N. J. (A)
Goodbar Mfg. Co., Div. Hargood Ribbon Co., New York (A, B, C, D)
Holland Insulated Wire & Cable Works, Ltd., Amsterdam, Holland (A)
Koehler, Karl, Assoc., Coopersburg, Pa. (B)
Levine, M. H., Co., New York (A, B, C)
Mason Envelope Co., New York (A)
Minnesota Mining & Mfg. Co., St. Paul, Minn. (A)
Parfait Promotional Packaging Co., New York (A, B, C, D)
•Plas-Ties Co., Santa Ana, Calif. (A)
Rosebud Mfg. Corp., New York (C, D)
Shore Line Industries, Inc., Clinton, Conn. (A)
Supreme Ribbon Corp., New York (A, B, C, D)
Taffel Bros., Inc., New York (A, C, D)
Taft, R. C., Co., Chicago (A, C, D)

ROLL LEAF, STAMPING FOIL

For editorial information, see Section 14

•Apex Machine Co., College Point, N. Y.
Coe, W. H., Mfg. Co., New York
Coughlin Mfg. Co., New York
G & T Mfg. Co., New Britain, Conn.
Hastings & Co., Philadelphia
•Industrial Marking Equipment, Inc., New York
•Olsenmark Corp., New York
Pannier Corp., Pittsburgh
•Peerless Roll Leaf Co., Union City, N. J.
Rubba, Inc., New York
Swift, M., & Sons, Inc., Hartford, Conn.

RUBBER OR RESIN DISPERSIONS

(See Latex)

RUBBER, SPONGE

(Protective Wadding)

For editorial information, see Section 18

Armour & Co., Curled Hair Div., Alliance, Ohio
Foam King, Inc., Bronx, N. Y.
U. S. Rubber Co., New York
Van Cleef Bros., Inc., Div. Johns-Manville, Chicago

RULE, CUTTING & DIE MAKING

For editorial information, see Section 14

Helmold, J. F., & Bro., Inc., Chicago
•Richards, J. A., Co., Kalamazoo, Mich.
Simonds Saw & Steel Co., Fitchburg, Mass.

SEALS

(Embossed on Paper, Foil, Etc.)

(See also Closures, Secondary)

For editorial information, see Section 15

American Tag Co., Belleville, N. J.
Angell Mfg. Co., Dayton, Ohio
Arkadia Label Corp., New York
Basca Mfg. Co., Div. Huyler's, Indianapolis
Cadillac Label Co., Kalamazoo, Mich.
•Cameo Die & Label Co., New York
Chicago Printed String Co., Chicago
•Dennison Mfg. Co., Framingham, Mass.
Dickinson, John, & Co., Hemel Hempstead, Herts., England
•Ever Ready Label Corp., Belleville, N. J.
•Foilcraft Printing Corp., Brooklyn, N. Y.
•Foxon Co., Providence, R. I.
French-Bray Printing Co., Baltimore, Md.
•H & R Industries, Nazareth, Pa.
•Hollander, Allen, Co., New York
Kaumagraph Co., Wilmington, Del.
•Kleen-Stik Products, Inc., Chicago
Krause, Richard M., Inc., New York
Merchandiser Press, Inc., New York
Milwaukee Label & Seal Co., Milwaukee
Oak Printing Co., Cleveland
Reyburn Mfg. Co., Philadelphia
•Reynolds Metals Co., Philadelphia
Strauss, Golman & Goldman Co., Dallas, Texas
Tablet & Ticket Co., Chicago
Talmadge Printing Co., New York
Unique Printed Products Co., Terre Haute, Ind.

SEALS, DRUM, METAL

For editorial information, see Section 17

•American Flange & Mfg. Co., New York
Gerrard, A. J., & Co., Melrose Park, Ill.
Van Leer's Vatenfabrieken N.V., Amsterdam, Holland

SEALS, PAIL, METAL

For editorial information, see Section 17

•American Flange & Mfg. Co., New York
Propack, Inc., Hingham, Mass.
Van Leer's Vatenfabrieken N.V., Amsterdam, Holland

SHROUDS

(See Liners, Bag, Barrel, Box, Case & Drum)

SPOOLS, FIBRE OR WOOD

For editorial information, see Section 18

Bogert & Hopper, Inc., New York
•Cleveland Container Co., Cleveland
Crescent Paper Tube Co., Covington, Ky.
Estes, E. B., & Sons, New York
Marshall Paper Tube Co., Randolph, Mass.
Nelson Co., Baltimore, Md.
Ohio Paper Products Co., Massillon, Ohio
Platt Corp., Baltimore, Md.
•R. C. Can Co., St. Louis, Mo.
Ritchie, W. C., & Co., Chicago
Sonoco Products Co., Hartsville, S. C.
Spenzer Container Corp., Greenville, Pa.
Sterling Lumber & Supply Co., Chicago

STAPLES, WIRE

For editorial information, see Section 18

•Acme Steel Co., Chicago
American Machine Works, Racine, Wis.
Arrow Fastener Co., Brooklyn, N. Y.
Bates Mfg. Co., Orange, N. J.
Bethlehem Steel Co., Bethlehem, Pa.
•Bostitch, Westerly, R. I.
Container Stapling Corp., Herrin, Ill.
Eastern Duo-Fast Corp., New York
General Staple Co., New York
Heller Co., Cleveland
Ideal Stitcher Co., Div. W. R. Pabich Mfg. Co., Chicago
•Inland Wire Products Co., Chicago
•International Staple & Machine Co., Herrin, Ill.
Lotz, Abbott & Co. Ltd., London, England
Mid-States Steel & Wire Co., Crawfordsville, Ind.
Neva-Clog Products, Inc., Bridgeport, Conn.
Precision Staple Corp., Sarasota, Fla.
Staplex Co., Brooklyn, N. Y.

STENCIL BOARD

For editorial information, see Section 12

Diagraph-Bradley Industries, Herrin, Ill.
Marsh Stencil Machine Co., Belleville, Ill.
Matthews, Jas. H., & Co., Pittsburgh
O'Malley, M. J., Co., Springfield, Mass.
Pannier Corp., Pittsburgh
Riegel Paper Corp., New York
Salwen, Joe, Paper Products Corp., New York

STOPPERS

A. *Glass* B. *Rubber*
C. *Polyethylene*

For editorial information, see Section 10

•Anchor Hocking Glass Corp., Lancaster, Ohio (A)
Demuth Glass Works, Parkersburg, W. Va. (C)
Gayner Glass Works, Inc., Salem, N. J. (A)
Lumelite Corp., Pawling, N. Y. (C)
•Pennsylvania Glass Products Co., Pittsburgh (A, B)
Special Glass Products Co., New York (A)
West Co., Phoenixville, Pa. (B)
Wheaton, T. C., Co., Millville, N. J. (A, B, C)

STRAPPING, STEEL

For editorial information, see Section 18

•Acme Steel Co., Chicago
Brainard Steel Div., Sharon Steel Corp., Warren, Ohio
Gerrard, A. J., & Co., Melrose Park, Ill.
•Inland Wire Products Co., Chicago
Renois Tying Machines, Melrose Park, Ill.
Signode Steel Strapping Co., Chicago
Stanley Works, Steel Strapping Div., New Britain, Conn.

STRING, PRINTED

(Plain & Decorative)

For editorial information, see Section 16

Arbetter Ribbon & Mfg. Co., Chicago
Cardinal Mills, Inc., Glen Cove, New York
Chicago Printed String Co., Chicago
Economy Novelty & Printing Co., New York
General Printed String Co., Milwaukee

TAGS

For editorial information, see Section 15

American Tag Co., Belleville, N. J.
•Cameo Die & Label Co., New York
Canada Paper "Wholesale" Ltd., Toronto, Ont.
Cupples-Hesse Corp., St. Louis, Mo.
•Dennison Mfg. Co., Framingham, Mass.

Dickinson, John, & Co., Hemel Hempstead, Herts., England
Dura-Lee Corp., Kansas City, Mo.
Equality Novelty Co., New York
Eureka Specialty Printing Co., Scranton, Pa.
•Ever Ready Label Corp., Belleville, N. J.
Fairbairn Tape & Label Co., San Francisco
Fox, C. J., Co., Providence, R. I.
•Foxon Co., Providence, R. I.
Fuller Label & Box Co., Pittsburgh
General Films, Inc., Covington, Ohio
Kimball, A., Co., New York
Kwik Lok Corp., Yakima, Wash.
Mason, F. E., & Sons, Batavia, N. Y.
Matthews, Jas. H., & Co., Pittsburgh
McCoy Label Co., San Francisco
Merchandiser Press, Inc., New York
Milwaukee Label & Seal Co., Milwaukee
Oberly & Newell Lithograph Corp., New York
Reyburn Mfg. Co., Philadelphia
Robinson Tag & Label Co., New York
Schmidt Lithograph Co., San Francisco
Spear Box Co., New York
Talmadge Printing Co., New York

TAPE, COTTON

For editorial information, see Section 5

Bauer & Black, Div. The Kendall Co., Chicago
Buser, R. G., Silk Corp., Paterson, N. J.
Cardinal Mills, Inc., Glen Cove, New York
Chicago Printed String Co., Chicago
Electro-Technical Products, Div. Sun Chemical Corp., Nutley, N. J.
Fairbairn Tape & Label Co., San Francisco
Fulton Bag & Cotton Mills, Atlanta, Ga.
General Printed String Co., Milwaukee
•Gummed Products Co., Troy, Ohio
Winne, Frank W., & Son, Inc., Philadelphia

TAPE, GUMMED, PLAIN

For editorial information, see Section 5

Adhesive Products, Inc., Albany, Calif.
Atlantic Gummed Paper Corp., Brooklyn, N. Y.
Bowaters Sales Co., London, England
Brown-Bridge Mills, Inc., Troy, Ohio
Camp Mfg. Co., Franklin, Va.
Canada Paper "Wholesale" Ltd., Toronto, Ont.
Central Paper Co., Menasha, Wis.
Central Supply Co., Milwaukee
Crown Zellerbach Corp., Western Gummed Tape Div., San Francisco
•Dennison Mfg. Co., Framingham, Mass.
Dickinson, John, & Co., Hemel Hempstead, Herts., England
•Ever Ready Label Corp., Belleville, N. J.
Fairbairn Tape & Label Co., San Francisco
•Gummed Products Co., Troy, Ohio
Gummed Tape & Devices Co., Brooklyn, N. Y.
Hudson Pulp & Paper Corp., New York
•Knowlton, M. D., Co., Rochester, N. Y.
Kupfer Bros. Co., New York
Label-Rite Co., Weston, Ont.
•Matthias Paper Corp., Philadelphia
McCoy Label Co., San Francisco
McLaurin-Jones Co., Brookfield, Mass.
Mid-States Gummed Paper Co., Chicago
Nashua Corp., Nashua, N. H.
Reyburn Mfg. Co., Philadelphia
Shamrock Paper Co., St. Louis, Mo.
Superior Tape Corp., Brooklyn, N. Y.
Stocker Mfg. Co., Netcong, N. J.
Thomas Stationery Mfg. Co., Springfield, Ohio
Tripp Tape, Inc., Melrose Park, Ill.
Warren Wire Co., Pownal, Vt.
Winne, Frank W., & Son, Inc., Philadelphia

TAPE, HEAT SEALING

For editorial information, see Section 5

•Arvey Corp., Chicago
Camp Mfg. Co., Franklin, Va.
Dalmas Ltd., Leicester, Va.
Dickinson, John, & Co., Hemel Hempstead, Herts., England
•Ever Ready Label Corp., Belleville, N. J.
Fairbairn Tape & Label Co., San Francisco
•Fibleco Illinois Corp., Chicago
Flexible Tape Co., Memphis, Tenn.
Griswold & Co., Montreal, Que.
•Hampton Mfg. Co., Industrial Tape Div., New Rochelle, N. Y.
Label-Rite Co., Weston, Ont.
Mason & Foster, Midland, Mich.
McCoy Label Co., San Francisco
McLaurin-Jones Co., Brookfield, Mass.
Minnesota Mining & Mfg. Co., St. Paul, Minn.
•Oliver Machinery Co., Grand Rapids, Mich.
Paper Converting & Finishing Co., Chicago
Permacel Tape Corp., New Brunswick, N.J.
Protexall Permanent Process Service, Kansas City, Mo.
•Pyroxylin Products, Inc., Chicago
Robinson, E. S. & A., (Canada) Ltd., Toronto, Ont.
Warren Wire Co., Pownal, Vt.
Winne, Frank W., & Son, Inc., Philadelphia
Wyndmoor Mfg. Corp., Newark, N. J.

TAPE, PRESSURE-SENSITIVE

(Self-Sealing)

For editorial information, see Section 5

•Armstrong Cork Co., Lancaster, Pa.
Avery Adhesive Label Corp., Monrovia, Calif.
Avery Paper Co., Painesville, Ohio
Bauer & Black, Div. The Kendall Co., Chicago
Behr-Manning, Troy, N. Y.
Brady, W. H., Co., Milwaukee
Camp Mfg. Co., Franklin, Va.
Cleveland Lathe & Machine Co., Cleveland
Dalmas Ltd., Leicester, England
•Dennison Mfg. Co., Framingham, Mass.
•Ever Ready Label Corp., Belleville, N. J.
Fairbairn Tape & Label Co., San Francisco
Flexible Tape Co., Memphis, Tenn.
Gummed Tape & Devices Co., Brooklyn, N. Y.
•Hampton Mfg. Co., Industrial Tape Div., New Rochelle, N. Y.
Industrial Tape Printers, Div. Industrial Equipment & Supply Co., Wernersville, Pa.
•Kleen-Stik Products, Inc., Chicago
Label-Rite Co., Weston, Ont.
Larido Corp., New York
Markandy, Inc., Kirkwood, Mo.
McCoy Label Co., San Francisco
Minnesota Mining & Mfg. Co., St. Paul, Minn.
Mystik Adhesive Products, Chicago
Nebel Paper Products Co., Charlotte, N. C.
Paper Converting & Finishing Co., Chicago
Permacel Tape Corp., New Brunswick, N. J.
Phoenix Products Co., Milwaukee
Printed Cellophane Tape Co., Los Angeles
Protexall Permanent Process Service, Kansas City, Mo.
Robinson, E. S. & A., (Canada) Ltd., Toronto, Ont.
Salem Label Co., Salem, Ohio
Seamless Rubber Co., F.O.S. Industrial Tape Div., New Haven, Conn.
Speedry Products, Inc., Richmond Hill, N. Y.
Topflight Corp., York, Pa.
Transparent Products Co., New York
Tripp Tape, Inc., Melrose Park, Ill.
U. S. Rubber Co., New York
U. S. Tape Corp., St. Louis, Mo.
Van Cleef Bros., Inc., Div. Johns-Manville, Chicago
•Vernon Chemical & Mfg. Corp., Mt. Vernon, N. Y.
Warren Wire Co., Pownal, Vt.
Williamson Adhesives, Inc., Skokie, Ill.
York Tape Printers, Inc., York, Pa.

TAPE, REINFORCED

For editorial information, see Section 5

Adhesive Products, Inc., Albany, Calif.
•Angier Corp., Framingham, Mass.
Atlantic Gummed Paper Corp., Brooklyn, N. Y.
Bauer & Black, Div. The Kendall Co., Chicago
Brown-Bridge Mills, Inc., Troy, Ohio
Camp Mfg. Co., Franklin, Va.
Central Paper Co., Menasha, Wis.
Central Supply Co., Milwaukee
Dickinson, John, & Co., Hemel Hempstead, Herts., England
Fairbairn Tape & Label Co., San Francisco
•Gummed Products Co., Troy, Ohio
•Hampton Mfg. Co., Industrial Tape Div., New Rochelle, N. Y.
Hudson Pulp & Paper Corp., New York
McCoy Label Co., San Francisco
McLaurin-Jones Co., Brookfield, Mass.
Mid-States Gummed Paper Co., Chicago
Minnesota Mining & Mfg. Co., St. Paul, Minn.
Mystik Adhesive Products, Chicago
Nashua Corp., Nashua, N. H.
Paper Converting & Finishing Co., Chicago
Permacel Tape Corp., New Brunswick, N. J.
Ranburn Co., Tonawanda, N. Y.
Seamless Rubber Co., F.O.S. Industrial Tape Div., New Haven, Conn.
Superior Tape Corp., Brooklyn, N. Y.
Stocker Mfg. Co., Netcong, N. J.
U. S. Rubber Co., New York
•Vernon Chemical & Mfg. Corp., Mt. Vernon, N. Y.
Warren Wire Co., Pownal, Vt.
York Tape Printers, Inc., York, Pa.

TAPE, WATER-RESISTANT

For editorial information, see Section 5

Adhesive Products, Inc., Albany, Calif.
•Angier Corp., Framingham, Mass.
Bauer & Black, Div. The Kendall Co., Chicago
Camp Mfg. Co., Franklin, Va.
Dalmas Ltd., Leicester, England
Fairbairn Tape & Label Co., San Francisco
•Gummed Products Co., Troy, Ohio
Gummed Tape & Devices Co., Brooklyn, N. Y.
•Hampton Mfg. Co., Industrial Tape Div., New Rochelle, N. Y.
McCoy Label Co., San Francisco
McLaurin-Jones Co., Brookfield, Mass.
Mid-States Gummed Paper Co., Chicago
Minnesota Mining & Mfg. Co., St. Paul, Minn.
Mystik Adhesive Products, Chicago
Paper Converting & Finishing Co., Chicago
Printed Cellophane Tape Co., Los Angeles
Robinson, E. S. & A., (Canada) Ltd., Toronto, Ont.
Seamless Rubber Co., F.O.S. Industrial Tape Div., New Haven, Conn.
Stocker Mfg. Co., Netcong, N. J.
U. S. Rubber Co., New York
U. S. Tape Corp., St. Louis, Mo.

Van Cleef Bros., Inc., Div. Johns-Manville, Chicago
•Vernon Chemical & Mfg. Corp., Mt. Vernon, N. Y.
Warren Wire Co., Pownal, Vt.
Williamson Adhesives, Inc., Skokie, Ill.
York Tape Printers, Inc., York, Pa.

TEXTILES, NON-WOVEN

(Heat Sealable)

For editorial information, see Section 7

Fulton Bag & Cotton Mills, Atlanta, Ga.
Kendall Mills, Div. The Kendall Co., Walpole, Mass.
•Visking Corp., Chicago

TINPLATE

For editorial information, see Section 9

Bethlehem Steel Co., Bethlehem, Pa.
Jones & Laughlin Steel Corp., Pittsburgh
United States Steel Co., Pittsburgh
Wheeling Steel Corp., Wheeling, W. Va.

TRANSPARENT FILMS, CELLOPHANE

For editorial information, see Section 4

•American Viscose Corp., AVISCO Film Div., Philadelphia
British Cellophane, Ltd., London, England
•du Pont de Nemours, E. I., & Co., Wilmington, Del.
•Olin Mathieson Chemical Corp., Film Div., New York

TRANSPARENT FILMS, PLASTIC

A. *Butyrate*
B. *Cellulose Acetate*
C. *Polyester*
D. *Polyethylene*
E. *Pliofilm*
F. *Vinyl*
G. *Saran & saran modifications*
H. *Vinyl-nitrile*

For editorial information, see Section 4

Anorgana G.M.B.H., Gendorf/Obb., Germany (F)
•Arvey Corp., Chicago (B, D, E, F, G, H)
•Bakelite Co., Div. Union Carbide & Carbon Corp., New York (F)
Blossom Mfg. Co., New York (B, D, E, F, G, H)
British Cellophane, Ltd., London, England (B, D, F)
•Celanese Corp. of America, New York (B, D)
•Cellu-Craft Products Corp., New Hyde Park, N. Y. (B, D, E, F, G)
•Chester Packaging Products Corp., Yonkers, N. Y. (D)
•Clopay Corp., Cincinnati (D, F)
Container Corp. of America, Traver Flexible Packaging Div., Chicago (B, D, E, F, G)
Craftint Mfg. Co., Cleveland (B)
•Davis, Joseph, Plastics Co., Arlington, N. J. (B, D)
Deerfield Plastics Co., So. Deerfield, Mass. (D)
•Dewey & Almy Chemical Co., Div. W. R. Grace & Co., Cambridge, Mass. (G)
Dixie Wax Paper Co., Dallas, Texas (B, D, E, F, G, H)
Dow Chemical Co., Midland, Mich. (G)
•du Pont de Nemours, E. I., & Co., Wilmington, Del (B, C, D)
Durethene Corp., Chicago (D)
•Eastman Kodak Co., Rochester, N. Y. (A, B)
Elm Coated Fabrics Co., New York (F)
•Extruders, Inc., Hawthorne, Calif. (D)
Extrudo-Film Corp., New York (D)
Firestone Tire & Rubber Co., Plastics Div., Pottstown, Pa. (D, F)
Frank, J. P., & Co., New York (D, F)
Freedman, Leonard, & Sons, New York (F)
•Gering Products, Inc., Kenilworth, N. J. (B, D)
Gilman Bros. Co., Gilman, Conn. (B)
•Goodyear Tire & Rubber Co., Akron, Ohio (E, F)
•H & R Industries, Nazareth, Pa. (D)
Harte & Co., New York (D, F)
Hedwin Corp., Baltimore, Md. (B, D, F)
Holland Insulated Wire & Cable Works, Ltd., Amsterdam, Holland (D, F)
Irvington Div., Minnesota Mining & Mfg. Co., Irvington, N. J. (D)
Kendall Co., Plastic Film Sales Dept., Chicago (D)
Kordite Corp., Macedon, N. Y. (B)
Kuss, R. L., & Co., Findlay, Ohio (F)
Magid-Robinson Co., New York (D, F)
Mehl Mfg. Co., Cincinnati (D)
Midwest Plastic Products Co., Chicago Heights, Ill. (B, D)
Mono-Sol Corp., Gary, Ind. (F)
•Monsanto Chemical Co., Springfield, Mass. (B, F)
Nixon Nitration Works, Nixon, N. J. (A, B, F)
•Olin Mathieson Chemical Corp., Film Div., New York (D)
Plastic Film Corp., Plainfield, Conn. (D, F)
•Plax Corp., West Hartford, Conn. (D)
Plicose Mfg. Corp., Brooklyn, N. Y. (D)
Poly Plastic Products, Inc., Paterson, N. J. (D)
Presto Plastic Products Co., New York (D, F)
•Queen Transparent Specialties, Chicago (B, D, E, G)
Robinson, A. E., Co., Chicago (B, D)
Ross & Roberts Co., Stratford, Conn. (D, F)
Shore Line Industries, Inc., Clinton, Conn. (D)
Sillcocks-Miller Co., Maplewood, N. J. (B, D, F)
Transilwrap Co., Chicago (B, D, E, F)
Transparent Packaging Corp., New York (D)
•United States Packaging Corp., Paterson, N. J. (D, F)
U. S. Rubber Co., New York (F)
•Vernon Chemical & Mfg. Corp., Mt. Vernon, N. Y. (F)
Visking Corp., Chicago (D)

TUBE CLIPS

For editorial information, see Section 9

Art Tube Co., Irvington, N. J.
•Frank, Walter, Elmhurst, Ill.

TUBING, EXTRUDED PLASTIC

For editorial information, see Sections 8, 9

•Anchor Plastics Co., Long Island City, N. Y.
Anorgana G.M.B.H. Gendorf/Obb., Germany
Associated Plastic Co., Midland, Mich.
Davidson Products Co., Seattle, Wash.
•Davis, Joseph, Plastics Co., Arlington, N. J.
Deerfield Plastics Co., So. Deerfield, Mass.
•Dewey & Almy Chemical Co., Div. W. R. Grace & Co., Cambridge, Mass.
Eclipse Plastic Industries, Inc., Sarasota, Fla.
•Extruded Plastics, Inc., Norwalk, Conn.
Extrudo-Film Corp., New York
Franklin Plastics, Inc., Franklin, Pa.
General Electric Co., Chemical & Metallurgical Div., St. Louis, Mo.
•Gering Products, Inc., Kenilworth, N. J.
•H & R Industries, Nazareth, Pa.
Hedwin Corp., Baltimore, Md.
Hydrawlik Co., Roselle, N. J.
Imperial Chemical Industries Ltd., Plastics Div., Welwyn Garden, Herts., England
Irvington Div., Minnesota Mining & Mfg. Co., Irvington, N. J.
Irwin Corp., Nashua, N. H.
Metal Box Co., Ltd., London, England
Plastic Packaging Co., Chicago
Plicose Mfg. Corp., Brooklyn, N. Y.
Poly Plastic Products, Inc., Paterson, N. J.
Sandee Mfg. Co., Chicago
Shoe Form Co., Auburn, N. Y.
Southern Plastics Co., Columbia, S. C.
Transparent Packaging Corp., New York
U. S. Rubber Co., New York
Universal Tube & Container Co., Waltham, Mass.
Visking Corp., Chicago

TUBING, EXTRUDED SOFT METAL

(Aluminum, Lead, Tin)

For editorial information, see Section 9

Aluminum Co. of America, Pittsburgh
Art Tube Co., Irvington, N. J.
•Reynolds Metals Co., Louisville, Ky.
•Wheeling Stamping Co., Wheeling, W.Va.

VALVES, AEROSOL

For editorial information, see Section 9

Aerated Container Corp., Chicago
Aerosol Research Co., Forest Park, Ill.
American Metal Products Co., Bridgeport, Conn.
Clayton Corp., St. Louis, Mo.
Dill Mfg. Co., Cleveland
Hampton Products Co., Portland, Pa.
Nanuet Valve Co., Nanuet, N. Y.
•Oil Equipment Laboratories, Inc., Elizabeth, N. J.
•Precision Valve Corp., Yonkers, N. Y.
Pressure Pack, Inc., Detroit
Purton, Inc., Sycamore, Ill.
•Risdon Mfg. Co., Naugatuck, Conn.
•Schrader's, A., Son, Div. Scovill Mfg. Co., Brooklyn, N. Y.
Sterling Seal Co., Erie, Pa.
Sun Tube Corp., Hillside, N. J.
West Penn Mfg. & Supply Corp., Brackenridge, Pa.

VARNISHES & LACQUERS

(See Coatings, Protective)

WADDING

(See Cushioning Materials)

WAX, COATING, LAMINATING, SEALING

For editorial information, see Sections 3, 4

Adhesive Products Corp., New York
Ainslie Co., Spokane, Wash.
Bareco Oil Co., Tulsa, Okla.
•Boler Petroleum Co., Philadelphia
Cochrane Chemical Co., Matawan, N. J.
Commerce Oil Corp., New York
Cooper, D. C., Chicago
Dickinson, John, & Co., Hemel Hempstead, Herts., England
Eastman Chemical Products, Inc., Kingsport, Tenn.
Glyco Products Co., New York
•Hamersley Mfg. Co., Garfield, N. J.
•Industrial Raw Materials Corp., New York

International Wax Refining Corp., Valley Stream, N. Y.
National Wax Co., Chicago
Petroleum Specialties, Inc., New York
Polymer Industries, Inc., Springdale, Conn.
•Pyroxylin Products, Inc., Chicago
•Semet-Solvay Petrochemical Div. Allied Chemical & Dye Corp., New York
Sun Oil Co., Philadelphia
Sure-Seal Corp., Salt Lake City, Utah
Tilbury Refining Corp., Brooklyn, N. Y.
Warwick Wax Co., Sub. Sun Chemical Corp., Long Island City, N. Y.
Wax Corp. of America, Brooklyn, N. Y.

WIRE

A. *Stapling* B. *Stitching*

For editorial information, see Section 12

•Acme Steel Co., Chicago (A, B)
American Machine Works, Inc., Racine, Wis. (A, B)
Bethlehem Steel Co., Bethlehem, Pa. (A, B)
Burgess Fastening Co., Cleveland (A, B)
Container Stapling Corp., Herrin, Ill. (A)
Diagraph-Bradley Industries, Inc., Herrin, Ill., (B)
General Staple Co., New York (B)
Heller Co., Cleveland (A, B)
Ideal Stitcher Co., Div. W. R. Pabich Mfg. Co., Chicago (A, B)
•Inland Wire Products Co., Chicago (A, B)
Jones & Laughlin Steel Corp., Pittsburgh (A, B)
Mid-States Steel & Wire Co., Crawfordsville, Ind. (A, B)
Pabich, W. R., Mfg. Co., Chicago (A, B)
Prentiss, George W., & Co., Holyoke, Mass., (A, B)
Standard Paper Box Machine Co., New York (B)

DISTRIBUTORS, JOBBERS & SALES AGENTS

(The following companies handle a variety of Materials & Supplies in a wide quantity range)

AP Applicator Co., Pleasantville, N. Y.
Abana Products, Inc., Chicago
Aldine Paper Co., New York
Allied Commodities Co., Minneapolis
Allied Display Materials, New York
American Cordage & Paper Corp., New York
Atlas Stamp Co., Youngstown, Ohio
Austin Industries, Inc., Marlboro, Mass.
B-B Shipping Room Supply Co., Chicago
Blake, Moffitt & Towne, San Francisco
Bracamonte, R. M., & Co., San Francisco
Bradner Smith & Co., Chicago
Braun, W., Co., Chicago
Burnett, R. L., Co., San Antonio, Texas
Carlyle Container Co., Charlotte, N. C.
Cello-Masters, Inc., New York
Central Ohio Paper Co., Columbus, Ohio
Chicago Paper Co., Chicago
Consolidated Paper Co., Brooklyn, N. Y.
Coy, Disbrow & Co., New York
Davidson Associates, New York
Elliott Mfg. Co., Fresno, Calif.
Exeter Paper Co., Chicago
Filpaco Industries, Inc., Chicago
Flyndustries, Inc., New York
Gould, Stephen, Paper Co., Jersey City, N. J.
Halsell Brokerage Co., Denver, Colo.
Hartung, A., & Co., Philadelphia
Hassler, W. Scott, Assoc., Chicago
Heaphy, Charles F., Co., New York
Hope Paper Co., Brooklyn, N. Y.
Hubbs, Charles F., & Co., Div. Hubbs Corp., Long Island City, N. Y.
Hughes & Hoffman, New York
Jaymark Paper Co., Hewlett, N. Y.
King, Charles E., & Co., Chicago
L & M Sales Co., Chicago
Leedpak-Leeds Sales Co., Inc., New York
Levine, M. H., Co., New York
Lotz, Abbott & Co., Ltd., London, England
Marks, Edward M., Co., Los Angeles
Minnesota Filler Co., Minneapolis
Orchard Paper Co., St. Louis, Mo.
Packageers Co., Chicago
Packaging Pioneers, Inc., Tuckahoe, N. Y.
Packmasters, Akron, Ohio
Pickwick Papers, Inc., New York
Pierson Assoc., Boston
Ponten, J. S., Co., Oakland, Calif.
Posner, S., Sons, Inc., Brooklyn, N. Y.
Royal Paper Co., New York
Royce, Stark & Co., Milwaukee
Safeway Products Div., Yorkville Paper Co., New York
Schnier, I. F., Co., San Francisco
Schulman, Frank, Paper Corp., New York
Shannon, Alexander J., Co., New York
Sovereign Paper Corp., Ridgewood, N. J.
Spec-Fab Co., Philadelphia
Stylecraft Packaging Service, Inc., Charlotte, N. C.
Supreme Ribbon Corp., New York
Thor Mac, Inc., Chicago
Timely Packaging Associates, New York
Triangle Container Corp., Chicago
Twitchell, E. W., Inc., Packaging Div., Philadelphia
United Mineral & Chemical Corp., New York
Utility Plastic Bag Co., Div. Western Burlap Bag Co., Chicago
Vickers, Charles D., & Co., Chicago
Visible Package Sales Corp., Chicago
W.E.W. Container Co., Brooklyn, N. Y.
West Coast Plastics Distributors, Inc., Culver City, Calif.
Wilsolite Corp., Buffalo, N. Y.
Winne, Frank W., & Son, Inc., Philadelphia

Container Suppliers Section

AMPULS, GLASS

For editorial information, see Section 10

Demuth Glass Works, Parkersburg, W. Va.
•Owens-Illinois Glass Co., Toledo, Ohio
Special Glass Products Co., New York
Techniglas, Adamston, N. J.
Wheaton, T. C., Co., Millville, N. J.

BAGS

(See also Envelopes)

BAGS, ANTI-TARNISH

(Cloth & Cotton-Lined Paper)

For editorial information, see Section 7

Accurate Flannel Bag Co., New York
Ames Bag Co., Selma, Ala.
Breetwor, I. N., & Assoc., Los Angeles
COSECO, Los Angeles
Celwa Products Co., New York
•Cottonluxe Mfg. Co., New York
Crystal-X Corp., Lenni Mills, Pa.
•Empire Specialty Envelope Co., Inc., Brooklyn, N. Y.
Eureka Mfg. Co., Taunton, Mass.
Homer-Alden Co., No. Attleboro, Mass.
Mason Envelope Co., New York
Ohio Bag Corp., New York
Pak-Rite Flexible Packaging Co., New York
Perry Envelope & Bag Co., New York

BAGS, DUPLEX

For editorial information, see Section 7

A ABA Cellophane Products Corp., Pasadena, Calif.
Aladdin Products Co., Woodside, N. Y.
•American Bag & Paper Corp., Philadelphia
Ames Bag Co., Selma, Ala.
Arkell Safety Bag Co., New York
Arkell & Smiths, Canajoharie, N. Y.
•Arvey Corp., Chicago
Atlantic Coffee Bag Co., Brooklyn, N. Y.
Austin Industries, Inc., Marlboro, Mass.
Bagcraft Corp. of America, Chicago
Bag-O-Matic Div., Century Engineering Co., Chicago
Bagphane Corp., Brooklyn, N. Y.
Bowaters Sales Co., London, England
Breetwor, I. N., & Assoc., Los Angeles
Camp Mfg. Co., Franklin, Va.
Cello Bag Co., Seattle, Wash.
Cello-Masters, Inc., New York
Cellophane Bag & Printing Corp., Brooklyn, N. Y.
•Cellu-Craft Products Corp., New Hyde Park, N. Y.
Central States Paper & Bag Co., St. Louis, Mo.
Champion Bag Co., Chicago
Cincinnati Industries, Inc., Cincinnati
Clearprint, Inc., New York
Comet Packaging & Paper Co., New York
•Continental Can Co., Shellmar-Betner Flexible Packaging Div., Mt. Vernon, Ohio
•Cromwell Paper Co., Chicago
Cupples-Hesse Corp., St. Louis, Mo.
Custom-Made Paper Bag Co., Long Island City, N. Y.
Diaphane Corp., Philadelphia
Dickinson, John, & Co., Hemel Hempstead, Herts., England
Dixie Wax Paper Co., Dallas, Texas
Dunmire Packaging Products Co., Los Angeles
Dura-Lee Corp., Kansas City, Mo.
•Equitable Paper Bag Co., Long Island City, N. Y.
Fulton Bag & Cotton Mills, Atlanta, Ga.
Hammond Bag & Paper Co., Wellsburg, W. Va.
Kehr Products Co., Philadelphia
Keystone Packaging Service, Easton, Pa.
Maine Potato Bag Co., Caribou, Maine
Mason Envelope Co., New York
•Matthias Paper Corp., Philadelphia
•Milprint, Inc., Milwaukee

Modern Transparent Mfg. Co., Scranton, Pa.
Moser Bag & Paper Co., Cleveland
Mountain Waterproof Papers, Inc. Worcester, Mass.
National Waterproof Papers, Inc., Beverly, N. J.
Nebel Paper Products Co., Charlotte, N. C.
Noon Bag Co., Portland, Ore.
•Oneida Paper Products, Inc., Clifton, N. J.
Package-Craft, Inc., Paterson, N. J.
Package Products Co., Charlotte, N. C.
Pak-Rite Flexible Packaging Co. New York
Peerless Packages, Inc., Cleveland
Perry Envelope & Bag Co., New York
Phillips Paper Products, Inc., Brooklyn, N. Y.
Print-A-Tube Co., Rochelle Park, N. J.
Propack, Inc., Hingham, Mass.
Protective Lining Corp., New York
•Quatrum Corp., Chicago
•Queen Transparent Specialties, Chicago
Raymond Bag Co., Middletown, Ohio
Rex Specialty Bag Corp., Brooklyn, N. Y.
Robert Corp., Lawrence, Mass.
Robinson, E. S. & A., (Canada) Ltd., Toronto, Ont.
Samson Plastic Products Co., Beverly Hills, Calif.
Southern Advance Bag & Paper Co., Boston
Standard Bag Sales Co., Long Island City, N. Y.
•Thilmany Pulp & Paper Co., Kaukauna, Wis.
Union Bag & Paper Corp., New York
Vanant Products, Tomah, Wis.
Visual Bag, Inc., New York
W.E.W. Container Co., Brooklyn, N. Y.
•Western Waxed Paper Div., Crown Zellerbach Corp., San Leandro, Calif.
Wrapture, Inc., Flushing, N. Y.

BAGS, GLASSINE OR WAXED

For editorial information, see Section 7

Aladdin Products Co., Woodside, N. Y.
Ames Bag Co., Selma, Ala.
Arkell Safety Bag Co., New York
Arkell & Smiths Co., Canojoharie, N. Y.
•Arvey Corp., Chicago
Atlantic Coffee Bag Co., Brooklyn, N. Y.
Bagcraft Corp. of America, Chicago
Bag-O-Matic Div., Century Engineering Co., Chicago
Beacon Paper Bag Co., East Paterson, N. J.
Bowaters Sales Co., London, England
Camp Mfg. Co., Franklin, Va.
Canada Foils, Ltd., Toronto, Ont.
Cellophane Bag & Printing Corp., Brooklyn, N. Y.
Central States Paper & Bag Co., St. Louis, Mo.
Central Waxed Paper Co., Chicago
Colonial Envelope Co., New York
Comet Packaging & Paper Co., New York
Container Corp. of America, Traver Flexible Packaging Div., Chicago
•Continental Can Co., Shellmar-Betner Flexible Packaging Div., Mt. Vernon, Ohio
•Cromwell Paper Co., Chicago
Cupples-Hesse Corp., St. Louis, Mo.
Custom-Made Paper Bag Co., Long Island City, N. Y.
Dickinson, John, & Co., Hemel Hempstead, Herts., England
Dixie Wax Paper Co., Dallas, Texas
Dunmire Packaging Products Co., Los Angeles
Duro Envelope Co., New York
•Equitable Paper Bag Co., Long Island City, N. Y.
Kehr Products Co., Philadelphia
•Marathon Corp., Menasha, Wis.
Mason Envelope Co., New York
•Matthias Paper Corp., Philadelphia
•Melrose Packaging, New York
Metal Box Co., Ltd., London, England
•Milprint, Inc., Milwaukee
Modern Transparent Mfg. Co., Scranton, Pa.
Moser Bag & Paper Co., Cleveland
Neostyle, Inc., Birmingham, Mich.
•Oneida Paper Products, Inc., Clifton, N. J.
Package-Craft, Inc., Paterson, N. J.
Pak-Rite Flexible Packaging Co., New York
Peerless Packages, Inc., Cleveland
Phillips Paper Products, Inc., Brooklyn, N. Y.
Phoenix Products Co., Milwaukee
Propack, Inc., Hingham, Mass.
Rex Specialty Bag Corp., Brooklyn, N. Y.
Robinson, E. S. & A., (Canada) Ltd., Toronto, Ont.
Standard Bag Sales Co., Long Island City, N. Y.
•Thilmany Pulp & Paper Co., Kaukauna, Wis.
Tower Envelope Co., New York
•United States Envelope Co., Springfield, Mass.
Vanant Products, Tomah, Wis.
W.E.W. Container Co., Brooklyn, N. Y.
•Western Waxed Paper Div., Crown Zellerbach Corp., San Leandro, Calif.
Wrapture, Inc., Flushing, N. Y.

BAGS, KRAFT, GROCERY

For editorial information, see Section 7

•American Bag & Paper Corp., Philadelphia
Bowaters Sales Co., London, England
Camp Mfg. Co., Franklin, Va.
•Continental Can Co., Shellmar-Betner Flexible Packaging Div., Mt. Vernon, Ohio
Dickinson, John, & Co., Hemel Hempstead, Herts., England
•Equitable Paper Bag Co., Long Island City, N. Y.
•Gaylord Container Corp., St. Louis, Mo.
Hudson Pulp & Paper Corp., New York
Kehr Products Co., Philadelphia
Metal Box Co., Ltd., London, England
Phillips Paper Products, Inc., Brooklyn, N. Y.
Phoenix Products Co., Milwaukee
St. Regis Paper Co., New York
Southern Advance Bag & Paper Co., Boston
Standard Bag Sales Co., Long Island City, N. Y.
Union Bag & Paper Corp., New York

BAGS, METAL FOIL

For editorial information, see Section 7

Arkell & Smiths Co., Canajoharie, N. Y.
•Arvey Corp., Chicago
Bagcraft Corp. of America, Chicago
Camp Mfg. Co., Franklin, Va.
Canada Foils, Ltd., Toronto, Ont.
Cello Bag Co., Seattle, Wash.
Cellophane Bag & Printing Corp., Brooklyn, N. Y.
Central States Paper & Bag Co., St. Louis, Mo.
Container Corp. of America, Chicago
•Continental Can Co., Shellmar-Betner Flexible Packaging Div., Mt. Vernon, Ohio
•Cromwell Paper Co., Chicago
Cupples-Hesse Corp., St. Louis, Mo.
Custom-Made Paper Bag Co., Long Island City, N. Y.
Dickinson, John, & Co., Hemel Hempstead, Herts., England
Dixie Wax Paper Co., Dallas, Texas
Driscoll, Frank H., Co., Winston-Salem, N. C.
•Foilcraft Printing Corp., Brooklyn, N. Y.
Forbes Lithograph Mfg. Co., Boston
Frank Paper Products Corp., Detroit
Hurwich, R., Co., Berkeley, Calif.
•Jiffy Mfg. Co., Hillside, N. J.
Kehr Products Co., Philadelphia
Kennedy Car Liner & Bag Co., Shelbyville, Ind.
Keystone Packaging Service, Easton, Pa.
Mehl Mfg. Co., Cincinnati
•Melrose Packaging, New York
•Mercury Heat Sealing Equipment Co., Philadelphia
•Milprint, Inc., Milwaukee
Modern Transparent Mfg. Co., Scranton, Pa.
Moser Bag & Paper Co., Cleveland
Nebel Paper Products Co., Charlotte, N. C.
•Oneida Paper Products, Inc., Clifton, N. J.
Pacific Coast Foil Co., Div. of Jorgenson & Co., San Francisco
Package-Craft, Inc., Paterson, N. J.
Print-A-Tube Co., Rochelle Park, N. J.
Propack, Inc., Hingham, Mass.
Protective Coatings Corp., Atlas Package & Container Corp. Div., Clifton, N. J.
Rex Specialty Bag Corp., Brooklyn, N. Y.
Robinson, E. S. & A., (Canada) Ltd., Toronto, Ont.
Spec-Fab Co., Philadelphia
Stylecraft Packaging Service, Inc., Charlotte, N. C.
United Mineral & Chemical Corp., New York
•United States Envelope Co., Springfield, Mass.
Vanant Products, Tomah, Wis.
•Western Waxed Paper Div., Crown Zellerbach Corp., San Leandro, Calif.
Wrapture, Inc., Flushing, N. Y.

BAGS, MULTIWALL HEAVY-DUTY

For editorial information, see Section 17

Ames Harris Neville Co., San Francisco
Arkell Safety Bag Co., New York
Arkell & Smiths, Canajoharie, N. Y.
Bemis Bro. Bag Co., St. Louis, Mo.
Bowaters Sales Co., London, England
Camp Mfg. Co., Franklin, Va.
Chase Bag Co., Chicago
Cincinnati Industries, Inc., Cincinnati
•Cromwell Paper Co., Chicago
•Equitable Paper Bag Co., Long Island City, N. Y.
Fulton Bag & Cotton Mills, Atlanta, Ga.
Hammond Bag & Paper Co., Wellsburg, W. Va.
Hudson Pulp & Paper Corp., New York
International Paper Co., Bagpak Div., New York
Kehr Products Co., Philadelphia
Modern Transparent Mfg. Co., Scranton, Pa.
•National Container Corp., New York
National Waterproof Papers, Inc., Beverly, N. J.
Noon Bag Co., Portland, Ore.
Plastic Packaging Co., Chicago
Propack, Inc., Hingham, Mass.
Raymond Bag Co., Middletown, Ohio
St. Regis Paper Co., New York
Southland Paper Converting Co., Los Angeles
Standard Bag Sales Co., Long Island City, N. Y.
Transparent Packaging Corp., New York
Union Bag & Paper Corp., New York
United Mineral & Chemical Corp., New York

BAGS, OPEN MESH

For editorial information, see Section 7

Ames Bag Co., Selma, Ala.
Ames Harris Neville Co., San Francisco
Bemis Bro. Bag Co., St. Louis, Mo.
Chase Bag Co., Chicago
Consolidated Bag Corp., Philadelphia
Fulton Bag & Cotton Mills, Atlanta, Ga.
Hardin Bag & Burlap Co., New Orleans, La.
Noon Bag Co., Portland, Ore.
Producers Exchange, Inc., Toledo, Ohio
•Thomson, James, & Co., New York
Ullman Bag Co., Detroit

BAGS, PADDED SHIPPING

(See Containers, Insulated)

BAGS, TEXTILE

A. Bulk Containers
B. Unit Containers

For editorial information, see Sections 7, 17

Ames Bag Co., Selma, Ala. (A, B)
Ames Harris Neville Co., San Francisco (A, B)
Bemis Bro. Bag Co., St. Louis, Mo. (A, B)
Burros Bag Co., Brooklyn, N. Y. (A, B)
Chase Bag Co., Chicago (A, B)
Consolidated Bag Corp., Philadelphia (A, B)
•Cottonluxe Mfg. Co., New York (B)
Dickinson, John, & Co., Hemel Hempstead, Herts., England (B)
Dura-Lee Corp., Kansas City, Mo. (B)
Fulton Bag & Cotton Mills, Atlanta, Ga. (A, B)
Grafflin Bag Co., Baltimore, Md. (A, B)
Hardin Bag & Burlap Co., New Orleans, La. (A, B)
Homer-Alden Co., No. Attleboro, Mass. (B)
Maine Potato Bag Co., Caribou, Maine (B)
Noon Bag Co., Portland, Ore. (A, B)
Ohio Bag Corp., New York (B)
Oppenheim Co., New York (A)
Phoenix Products Co., Milwaukee (A, B)
Propack, Inc., Hingham, Mass. (A)
Rex Specialty Bag Corp., Brooklyn, N. Y. (A, B)
Siris, A. J., Products Corp., New York (B)
Thomas Stationery Mfg. Co., Springfield, Ohio (B)
Ullman Bag Co., Detroit (A, B)

BAGS, TRANSPARENT FILM

(Plastic & Cellulosic)

For editorial information, see Section 7

A ABA Cellophane Products Corp., Pasadena, Calif.
Aladdin Products Co., Woodside, N. Y.
American Kleer-Vu Plastics, Inc., Maspeth, N. Y.
Ames Bag Co., Selma, Ala.
Ames Harris Neville Co., San Francisco
Arkell Safety Bag Co., New York
Arkell & Smiths, Canajoharie, N. Y.
•Arvey Corp., Chicago
Austin Industries, Inc., Marlboro, Mass.
Bagcraft Corp. of America, Chicago
Bag-O-Matic Div., Century Engineering Co., Chicago
Bagphane Corp., Brooklyn, N. Y.
Bellen Co., Chicago
Bemis Bro. Bag Co., St. Louis, Mo.
Better Bags, Inc., Philadelphia
Blank, Arthur, & Co., Boston
Blossom Mfg. Co., New York
Bowaters Sales Co., London, England
Breetwor, I. N., & Assoc., Los Angeles
Brockton Mfg. Co., Brockton, Mass.
Brooks Paper Co., St. Louis, Mo.
COSECO, Los Angeles
Canada Foils, Ltd., Toronto, Ont
Canton Containers, Inc., Canton, Ohio
Cello Bag Co., Seattle, Wash.
Cello-Masters, Inc., New York
Cello-Pack, Inc., Buffalo, N. Y.
Cellophane Bag & Printing Corp., Brooklyn, N. Y.
•Cellu-Craft Products Corp., New Hyde Park, N. Y.
Central States Paper & Bag Co., St. Louis, Mo.
Champion Bag Co., Chicago
Chase Bag Co., Chicago
Clearco Products Co., New York
Clearprint, Inc., New York
Collier Mfg. Corp., Div. Warren Featherbone Co., Three Oaks, Mich.
Colonial Envelope Co., New York
Comet Packaging & Paper Co., New York
Consolidated Bag Corp., Philadelphia
Container Corp. of America, Chicago
•Continental Can Co., Shellmar-Betner Flexible Packaging Div., Mt. Vernon, Ohio
Crowell Carton Co., Marshall, Mich.
Crystal Tube Corp., Chicago
Crystal-X Corp., Lenni Mills, Pa.
Cupples-Hesse Corp., St. Louis, Mo.
Custom-Made Paper Bag Co., Long Island City, N. Y.
Deerfield Plastics Co., So. Deerfield, Mass.
•Dewey & Almy Chemical Co., Div. W. R. Grace & Co., Cambridge, Mass.
Diaphane Corp., Philadelphia
Dickinson, John, & Co., Hemel Hempstead, Herts., England
Dixie Wax Paper Co., Dallas, Texas
•Dobeckmun Co., Cleveland
Dunmire Packaging Products Co., Los Angeles
Dura-Lee Corp., Kansas City, Mo.
Duro Envelope Co., New York
Electronic Wave Products, Inc., New York
•Equitable Paper Bag Co., Long Island City, N. Y.
•Fibleco Illinois Corp., Chicago
Forbes Lithograph Mfg. Co., Boston
Frank Paper Products Corp., Detroit
Fulton Bag & Cotton Mills, Atlanta, Ga.
General Films, Inc., Covington, Ohio
•Growers Container Corp., Salinas, Calif.
•H & R Industries, Nazareth, Pa.
Hedwin Corp., Baltimore, Md.
Holland Insulated Wire & Cable Works Ltd., Amsterdam, Holland
Howard Plastics, Inc., Council Bluffs, Iowa
Humitube Mfg. Co., Peoria, Ill.
Hurwich, R., Co., Berkeley, Calif.
Kage Co., Manchester, Conn.
Kehr Products Co., Philadelphia
Kennedy Car Liner & Bag Co., Shelbyville, Ind.
Keystone Packaging Service, Easton, Pa.
Kordite Corp., Macedon, N. Y.
Kuss, R. L., & Co., Findlay, Ohio
Majikweld Corp., New York
Mason Envelope Co., New York
Mehl Mfg. Co., Cincinnati
•Melrose Packaging, New York
•Mercury Heat Sealing Equipment Co., Philadelphia
Metal Box Co., Ltd., London, England
•Milprint, Inc., Milwaukee
Modern Packages, Inc., Los Angeles
Modern Transparent Mfg. Co., Scranton, Pa.
Myron Mfg. Corp., New York
Nashua Corp., Nashua, N. H.
National Waterproof Papers, Inc., Beverly, N. J.
Nebel Paper Products Co., Charlotte, N. C.
Neostyle, Inc., Birmingham, Mich.
New Jersey Transparent Co., Newark, N. J.
Noon Bag Co., Portland, Ore.
•Oneida Paper Products, Inc., Clifton, N. J.
Package-Craft, Inc., Paterson, N. J.
Package Products Co., Charlotte, N. C.
Packageers Co., Chicago
Packaging Products, Inc., Kansas City, Mo.
Pak-Rite Flexible Packaging Co., New York
Par-Pak Co., Lakewood, Ohio
Peerless Packages, Inc., Cleveland
Perry Envelope & Bag Co., New York
Pexco Bag Mfg. Co., Toledo, Ohio
Phoenix Products Co., Milwaukee
Pierson Associates, Boston
Pioneer Valley Plastics Co., Chicopee, Mass.
Plastic Packaging Co., Chicago
Polo Plastics Co., Milwaukee
Poly Plastic Products, Inc., Paterson, N. J.
Prepac, Inc., New York
Print-A-Tube Co., Rochelle Park, N. J.
Producers Exchange, Inc., Toledo, Ohio
Protective Coatings Corp., Atlas Package & Container Corp. Div., Clifton, N. J.
Protective Lining Corp., New York
Puritan Packaging Corp., Columbus, Ohio
•Quatrum Corp., Chicago
•Queen Transparent Specialties, Chicago
Robert Corp., Lawrence, Mass.
Robinson, E. S. & A., (Canada) Ltd., Toronto, Ont.
Rollprint Products Corp., Chicago
Samson Plastic Products Co., Beverly Hills, Calif.
Schmitz, Henry A., Inc., Ballston Spa, N. Y.
Shore Line Industries, Inc., Clinton, Conn.
Spec-Fab Co., Philadelphia
Standard Bag Sales Co., Long Island City, N. Y.
Stylecraft Packaging Service, Inc., Charlotte, N. Y.
Tee-Pak, Inc., Chicago
Tower Envelope Co., New York
Transparent Package Co., Chicago
Transparent Packaging Corp., New York
Transparent Paper Ltd., London, England
United Mineral & Chemical Corp., New York
•United States Envelope Co., Springfield, Mass.
•United States Packaging Corp., Paterson, N. J.
Utility Plastic Bag Co., Div. Western Burlap Bag Co., Chicago
Vanant Products, Tomah, Wis.
Vis-A-Pac Co., Beverly, N. J.
Visual Bag, Inc., New York
Vizofilm Mfg. Corp., Bronx, N. Y.
W.E.W. Container Co., Brooklyn, N. Y.
West Co., Phoenixville, Pa.
Winzen Research, Inc., Minneapolis
Wrapture, Inc., Flushing, N. Y.

BAGS, WINDOW

For editorial information, see Section 7

Aladdin Products Co., Woodside, N. Y.
Arkell & Smiths, Canajoharie, N. Y.
Bemis Bro. Bag Co., St. Louis, Mo.
Bowaters Sales Co., London, England
Cellophane Bag & Printing Corp., Brooklyn, N. Y.
Chase Bag Co., Chicago
Clearprint, Inc., New York
Colonial Envelope Co., New York
Custom-Made Paper Bag Co., Long Island City, N. Y.
Dickinson, John, & Co., Hemel Hempstead, Herts., England
Duro Envelope Co., New York
•Equitable Paper Bag Co., Long Island City, N. Y.
Kehr Products Co., Philadelphia
Mason Envelope Co., New York
Mehl Mfg. Co., Cincinnati
Metal Box Co., Ltd., London, England
•Milprint, Inc., Milwaukee
Modern Packages, Inc., Los Angeles
Moser Bag & Paper Co., Cleveland
Nebel Paper Products Co., Charlotte, N. C.
Noon Bag Co., Portland, Ore.
•Oneida Paper Products, Inc., Clifton, N. J.
Package Products Co., Charlotte, N. C.
Pak-Rite Flexible Packaging Co., New York
Peerless Packages, Inc., Cleveland
Perry Envelope & Bag Co., New York
Pioneer Valley Plastics Co., Chicopee, Mass.
Protective Coatings Corp., Atlas Package & Container Corp. Div., Clifton, N. J.
•Queen Transparent Specialties, Chicago
Robinson, E. S. & A., (Canada) Ltd., Toronto, Ont.
St. Regis Paper Co., New York
Standard Bag Sales Co., Long Island City, N. Y.
Union Bag & Paper Corp., New York
•United States Envelope Co., Springfield, Mass.
W.E.W. Container Co., Brooklyn, N. Y.

BARRELS, METAL

(See Drums & Barrels)

BARRELS, WOODEN

A. *Slack*
B. *Tight*

For editorial information, see Section 17

Eppler, John, Co., Baltimore, Md. (B)
Fessenden Companies, Inc., Townsend, Mass. (A, B)
Gibbs Bros., Cooperage Co., Hot Springs, Ark. (B)
Greif Bros. Cooperage Corp., Delaware, Ohio (A, B)
Hamlen, J. H., & Son, Little Rock, Ark. (B)
Illinois Cooperage Mfg. Co., Chicago (A)
Jerry, Stephen, & Co., Brooklyn, N. Y. (A)
Keokuk Barrel Co., Keokuk, Iowa (B)
Monmouth Container Corp., Matawan, N. J. (A)
Nelson Co., Baltimore, Md. (A)
Northern Cooperage Div., The Greif Bros. Cooperage Corp., St. Paul, Minn. (A, B)
Pioneer Cooperage Co. of Illinois, Chicago (B)
Raible, J. R., Co., Birmingham, Ala. (A)
Sandusky Cooperage Lumber Co., Div. Greif Bros. Cooperage Corp., St. Louis, Mo. (A)
Sauer Cooperage Co., Wyandotte, Mich. (A, B)

BOTTLES, GLASS

A. *Beer*
B. *Beverage*
C. *Milk*
D. *Spirits*

For editorial information, see Section 10

•Anchor Hocking Glass Corp., Lancaster, Ohio (A, B, D)
•Armstrong Cork Co., Lancaster, Pa. (A, B, D)
Atlantic Glass Co., Baltimore, Md. (A, B, D)
•Ball Brothers Co., Muncie, Ind. (A, D)
Brockway Glass Co., Brockway, Pa. (A, B, D)
Consumers Glass Co. Ltd., Montreal, Que. (A, B, C, D)
Foster-Forbes Glass Co., Marion, Ind. (A, B, D)
Glass Container & Closure Co., Brooklyn, N. Y. (A, B, C, D)
Glass Containers, Inc., San Francisco (A, B, C, D)
Glenshaw Glass Co., Glenshaw, Pa. (A, B, C, D)
•Hazel-Atlas Glass Co., Wheeling, W. Va. (A, B, D)
Knox Glass Associates, Knox, Pa. (A, B, C, D)
Northwestern Glass Co., Seattle, Wash. (A, B, C)
Obear Nester Glass Co., East St. Louis, Ill. (A, B, D)
•Owens-Illinois Glass Co., Toledo, Ohio (A, B, C, D)
Ross Container & Seal Co., New York (A, C, D)
Thatcher Glass Mfg. Co., Elmira, N. Y. (A, B, C, D)
Universal Glass Products Co., Parkersburg, W. Va. (A, B, C, D)

BOTTLES, HAND MADE

For editorial information, see Sections 10, 16

•Anchor Hocking Glass Corp., Lancaster, Ohio
Carr-Lowrey Glass Co., Baltimore, Md.
Corning Glass Works, Corning, N. Y.
•Erno Products Co., Philadelphia
•Frank, Walter, Elmhurst, Ill.
Gayner Glass Works, Inc., Salem, N. J.
•Owens-Illinois Glass Co., Toledo, Ohio
Richford Corp., New York
Special Glass Products Co., New York
Wheaton, T. C., Co., Millville, N. J.

BOTTLES, MINIATURE

For editorial information, see Sections 10, 16

AP Applicator Co., Pleasantville, N. Y.
Carr-Lowrey Glass Co., Baltimore, Md.
•Erno Products Co., Philadelphia
Foster-Forbes Glass Co., Marion, Ind.
•Frank, Walter, Elmhurst, Ill.
•Hazel-Atlas Glass Co., Wheeling, W. Va.
Obear Nester Glass Co., East St. Louis, Ill.
•Owens-Illinois Glass Co., Toledo, Ohio
•Pennsylvania Glass Products Co., Pittsburgh
Richford Corp., New York
Special Glass Products Co., New York

BOTTLES, PLASTIC

For editorial information, see Section 8

Beaman Plastics, Portland, Ore.
•Bradley Container Corp., Maynard, Mass.
•Continental Can Co., Millsplastic Div., Chicago
•Erno Products Co., Philadelphia
Foster Grant Co., Leominster, Mass.
•Imco Container Corp., Kansas City, Mo.
•Plax Corp., West Hartford, Conn.
Precision Extruders, Leominster, Mass.
•Royal Mfg. Co., Prescott, Ariz.
Wheaton Plastics Co., Mays Landing, N. J.

BOTTLES, PROPRIETARY & PRESCRIPTION

For editorial information, see Section 10

•Anchor Hocking Glass Corp., Lancaster, Ohio
•Armstrong Cork Co., Lancaster, Pa.
Atlantic Glass Co., Baltimore, Md.
•Ball Brothers Co., Muncie, Ind.
Brockway Glass Co., Brockway, Pa.
Carr-Lowrey Glass Co., Baltimore, Md.
Consumers Glass Co. Ltd., Montreal, Que.
•Erno Products Co., Philadelphia
Foster-Forbes Glass Co., Marion, Ind.
•Frank, Walter, Elmhurst, Ill.
Gayner Glass Works, Inc., Salem, N. J.
Glass Containers, Inc., San Francisco
•Hazel-Atlas Glass Co., Wheeling, W. Va.
Kerr, Alexander H., & Co., Los Angeles
Knox Glass Associates, Inc., Knox, Pa.
Maryland Glass Corp., Baltimore, Md.
Obear Nester Glass Co., East St. Louis, Ill.
•Owens-Illinois Glass Co., Toledo, Ohio
•Pennsylvania Glass Products Co., Pittsburgh
Wheaton, T. C., Co., Millville, N. J.

BOTTLES, SERUM

For editorial information, see Section 10

Corning Glass Works, Corning, N. Y.
•Erno Products Co., Philadelphia
Obear Nester Glass Co., East St. Louis, Ill.
•Owens-Illinois Glass Co., Toledo, Ohio
Special Glass Products Co., New York
Wheaton, T. C., Co., Millville, N. J.

BOTTLES, TOILET, PERFUME, COSMETIC

For editorial information, see Sections 10, 16

•Anchor Hocking Glass Corp., Lancaster, Ohio
•Armstrong Cork Co., Lancaster, Pa.
Atlantic Glass Co., Baltimore, Md.
•Ball Brothers Co., Muncie, Ind.
Brockway Glass Co., Brockway, Pa.
Carr-Lowrey Glass Co., Baltimore, Md.
Consumers Glass Co. Ltd., Montreal, Que.
•Erno Products Co., Philadelphia
Foster-Forbes Glass Co., Marion, Ind.
•Frank, Walter, Elmhurst, Ill.
Gayner Glass Works, Inc., Salem, N. J.
Glass Containers, Inc., San Francisco
•Hazel-Atlas, Wheeling, W. Va.
Knox Glass Associates, Inc., Knox, Pa.
Maryland Glass Corp., Baltimore, Md.
Northwestern Glass Co., Seattle, Wash.
Obear Nester Glass Co., East St. Louis, Ill.
•Owens-Illinois Glass Co., Toledo, Ohio
Richford Corp., New York
Ross Container & Seal Co., New York
Special Glass Products Co., New York
Wheaton, T. C., Co., Millville, N. J.

BOTTLES & JARS, APPLIED COLOR

For editorial information, see Section 10

•Anchor Hocking Glass Corp., Lancaster, Ohio
•Armstrong Cork Co., Lancaster, Pa.
Atlantic Glass Co., Baltimore, Md.
Brockway Glass Co., Brockway, Pa.
Carr-Lowrey Glass Co., Baltimore, Md.
Consumers Glass Co. Ltd., Montreal, Que.
•Erno Products Co., Philadelphia
•Frank, Walter, Elmhurst, Ill.
Gayner Glass Works, Inc., Salem, N. J.
Glass Containers, Inc., San Francisco
Glenshaw Glass Co., Glenshaw, Pa.
•Hazel-Atlas Glass Co., Wheeling, W. Va.
Knox Glass Associates, Inc., Knox, Pa.
Obear Nester Glass Co., East St. Louis, Ill.
•Owens-Illinois Glass Co., Toledo, Ohio
Special Glass Products Co., New York
Thatcher Glass Mfg. Co., Elmira, N. Y.
Wheaton, T. C., Co., Millville, N. J.

BOXES, FABRIC OR LEATHERETTE COVERED

A. *Metal Base*
B. *Paper Base*
C. *Wood Base*

For editorial information, see Section 16

AAAAAA-Ace Paper Box Corp., New York (B)
Abana Products, Inc., Chicago (B)
Ainslie Co., Spokane, Wash. (B)
Apex Paper Box Corp., Chicago (B, C)
•Arrow Mfg. Co., West New York, N. J. (A, B, C)
Box Shop, Inc., New Haven, Conn. (B)
Boxcraft Paper Box Co., Oakland, Calif. (B)
Bradley & Gilbert Co., Louisville, Ky. (B)
Braun-Crystal Mfg. Co., Middle Village, N. Y. (C)
•Brooks & Porter, Inc., New York (B)
Buffinton Made-Rite Box Co., Providence, R. I. (A, B)
Burnett, R. L., Co., San Antonio, Texas (B)
C & M Mfg. Co., Providence, R. I. (A, B, C)
Casco Paper Box Co., Portland, Maine (B)
Casselman, T. & E., Inc., New York (B)
Chaffee Brothers Co., Oxford, Mass. (C)
•Chaspec Mfg. Co., Greenwich, Conn. (A, B, C)
Collett Sproule Boxes Ltd., Toronto, Ont. (B)
Columbus Paper Box Co., Columbus, Ohio (B)
Copeland Displays, Inc., New York (A, C)
Davis, S. H., Paper Box Co., Toledo, Ohio (B)
Dayton Embossed Products Corp., Dayton, Ohio (A, B, C)
De Luxe Craft Mfg. Co., Chicago (B, C)

Earlville Paper Box Co., Earlville, N. Y. (B, C)
Essex Paper Box Mfg. Co., Newark, N. J. (B)
Eureka Mfg. Co., Taunton, Mass. (C)
Flower City Specialty Co., Rochester, N. Y. (B)
Frankenberg Bros., Inc., Columbus, Ohio (B)
Globe Paper Box Co., Chicago (B, C)
Heminway Corp., Waterbury, Conn. (B)
Homer-Alden Co., No. Attleboro, Mass. (B, C)
Imperial Paper Box Corp., Brooklyn, N. Y. (B)
Jackson Paper Box Co., Jackson, Mich. (B)
Jones, Jesse, Box Corp., Philadelphia (A, B, C)
Kalamazoo Paper Box Co., Kalamazoo, Mich. (B)
Kiernan-Hughes Co., Jersey City, N. J. (B)
Krause, Frederick A., Associates, Inc., Frenchtown, N. J. (A, B, C)
Landowne, L., Co., Brooklyn, N. Y. (B)
Lengsfield Brothers, Inc., New Orleans, La. (B)
Leominster Paper Box Co., Leominster, Mass. (B, C)
Levy, J., New York (C)
Livingston & Co., New York (B)
Mason Box Co., Attleboro, Mass. (B)
Molitor Box Co., Milwaukee (B)
Nelson Co., Baltimore, Md. (C)
New York Label & Box Corp., New York (B)
Niagara Box Factory, Inc., New York (B)
Northwestern Paper Box Co., Seattle, Wash. (B)
Novel Enterprises, Brooklyn, N. Y. (B, C)
Opticase Co., Newark, N. J. (A, B)
Orchard Paper Co., St. Louis., Mo. (B)
Pacific Paper Box Co., Los Angeles (B)
Pacific Paper Box Co., Portland, Ore. (B)
Paper Package Co., Indianapolis (B)
Paragon Box Co., Atlanta, Ga. (B)
Pilliod Cabinet Co., Swanton, Ohio (B, C)
Quality Park Box Co., St. Paul, Minn. (B)
Rappaport, S., Inc., New York (B)
Rhoades Paper Box Co., Springfield, Ohio (B)
Ritchie, W. C., & Co., Chicago (B)
St. Regis Paper Co., New York (B)
San Diego Paper Box Co., San Diego, Calif. (B)
Sidney Paper Box Co., Blanchester, Ohio (B, C)
Smith, S. K., Co., Chicago (A, B, C)
Spitzer Paper Box Co., Toledo, Ohio (B)
Star Case Co., New York (C)
Stylepak Box Corp., Los Angeles (B)
Tarshis, Nathan L., Co., New York (B)
Taylor Box Co., Warren, R. I. (A, B)
Trilsch, Oscar, Co., Whitestone, N. Y. (B)
United Paper Box Co., San Francisco (B)
Universal Jewelry Case Co., Chicopee, Mass. (B)
•Warner Bros. Co., Bridgeport, Conn. (B)
Williams Bros. Paper Box Co., St. Joseph, Mich. (B)
Zumbiel, C. W., Co., Cincinnati (B)

BOXES, FANCY WOOD

For editorial information, see Section 16

Andre Paper Box Co., San Francisco
Apex Paper Box Corp., Chicago
Autocraft Box Corp., York, Pa.
Bigelow-Garvey Lumber Co., Chicago
Bogert & Hopper, Inc., New York
Brown & Bailey Co., Philadelphia
Chaffee Brothers Co., Oxford, Mass.
Copeland Displays, Inc., New York
Dunning, J. H., Corp., Darien, Conn.
Estes, E. B., & Sons, New York
Eureka Mfg. Co., Taunton, Mass.
Gebhart Folding Box Co., Dayton, Ohio
Homer-Alden Co., No. Attleboro, Mass.
Jones, Jesse, Box Corp., Philadelphia
Leominster Paper Box Co., Leominster, Mass.
Nelson Co., Baltimore, Md.
Northwestern Paper Box Co., Seattle, Wash.
Pilliod Cabinet Co., Swanton, Ohio
Rock Mfg. Co., Stoughton, Mass.
South Bend Box Co., Div. General Building Materials, Inc., South Bend, Ind.
Tell City Furniture Co., Chicago

BOXES, FOLDING

(See Cartons, Folding & Display)

BOXES, MAILING

For editorial information, see Section 6

AAAAAA-Ace Paper Box Corp., New York
Abana Products, Inc., Chicago
Acme Folding Box Co., New York
Acme Paper Box Co., San Francisco
Ainslie Co., Spokane, Wash.
Andre Paper Box Co., San Francisco
Apex Paper Box Corp., Chicago
Athol Paper Box Mfg. Co., Athol, Mass.
Atlantic Paper Box Co., Boston
Avalon Paper Box Co., Los Angeles
Bechtold, C. B., Co., Philadelphia
•Berles Carton Co., Paterson, N. J.
Birmingham Paper Co., Birmingham, Ala.
Box Shop, Inc., New Haven, Conn.
Bradley & Gilbert Co., Louisville, Ky.
Bristol Paper Box Co., Bristol, Va.
•Brooks & Porter, Inc., New York
Buffinton Made-Rite Box Co., Providence, R. I.
Burnett, R. L., Co., San Antonio, Texas
Burton Packaging Co., New York
Cambridge Paper Box Co., Cambridge, Mass.
Casco Paper Box Co., Portland, Maine
Casselman, T. & E., Inc., New York
Cin-Made Corp., Cincinnati
Collett Sproule Boxes Ltd., Toronto, Ont.
Comly-Gillam Carton Corp., Philadelphia
Crescent Box Corp., Philadelphia
Curtis, S., & Son, Inc., Sandy Hook, Conn.
Davis, S. H., Paper Box Co., Toledo, Ohio
Edwards Folding Box Co., Philadelphia
•Erno Products Co., Philadelphia
Essex Paper Box Mfg. Co., Newark, N. J.
Flower City Specialty Co., Rochester, N. Y.
Frankenberg Bros., Inc., Columbus, Ohio
Gereke-Allen Carton Co., Div. Eddy Paper Corp., St. Louis, Mo.
Globe Paper Box Co., Chicago
•Hinde & Dauch, Sandusky, Ohio
Hollinger Corp., Arlington, Va.
Jackson Paper Box Co., Jackson, Mich.
Jones, Jesse, Box Corp., Philadelphia
Kalamazoo Paper Box Co., Kalamazoo, Mich.
Kiernan-Hughes Co., Jersey City, N. J.
Kresge Paper Box Co., Bethlehem, Pa.
Kroeck Paper Box Co., Chicago
•Lebanon Paper Box Co., Lebanon, Pa.
Lengsfield Bros., Inc., New Orleans, La.
Mankato Paper Box Co., Mankato, Mich.
Manufacturers Box Co., Bridgeport, Conn.
Mason Box Co., Attleboro, Mass.
•Miller, Walter P., Co., Inc., Philadelphia
Modern Boxes, Inc., Chicago, Ill.
Mohawk Containers, Inc., New Hartford, N. Y.
Molitor Box Co., Milwaukee
Mullery Paper Packages, Inc., St. Paul, Minn.
Nashua Paper Box Co., Nashua, N. H.
•National Folding Box Co., Sub. Federal Paper Board Co., New York
National Metal Edge Box Co., Philadelphia
Nelson, B. F., Mfg. Co., Minneapolis
New Jersey Partition & Box Co., Newark, N. J.
New York Label & Box Corp., New York
Newark Paper Box Co., Newark, N. J.
Northwestern Paper Box Co., Seattle, Wash.
•Old Dominion Box Co., Charlotte, N. C.
Pacific Paper Box Co., Los Angeles
Pacific Paper Box Co., Portland, Ore.
Packard Container Corp., Hoboken, N. J.
Paper Package Co., Indianapolis
Paragon Box Co., Atlanta, Ga.
Pohlig, Brothers, Inc., Richmond, Va.
Quality Park Box Co., St. Paul, Minn.
Quincy Paper Box Co., Quincy, Ill.
Ranburn Co., Inc., Tonawanda, N. Y.
Rhoades Paper Box Co., Springfield, Ohio
Ritchie, W. C., & Co., Chicago
San Diego Paper Box Co., San Diego, Calif.
Schmidt, Henry, & Bro., Inc., Philadelphia
Seasongood Folding Box Co., Harrison, Ohio
Shoup-Owens, Inc., Hoboken, N. J.
Sidney Paper Box Co., Blanchester, Ohio
Snyder, George H., Inc., Philadelphia
Sparks Corp., Philadelphia
Spear Box Co., New York
Spitzer Paper Box Co., Toledo, Ohio
Stylepak Box Corp., Los Angeles
Taylor Box Co., Warren, R. I.
United Paper Box Co., San Francisco
Universal Folding Box Co., Hoboken, N. J.
Warder Paper Box Co., Niagara Falls, N. Y.
Weil & Newman, Inc., Brooklyn, N. Y.
Winona Paper Box Co., Los Angeles
Wolf Die Cutting Co., Brooklyn, N. Y.
Youse, C. J., Co. of Baltimore City, Baltimore, Md.
Zumbiel, C. W., Co., Cincinnati

BOXES, METAL, COVERED

(Fabric, Leatherette, Etc.)

(See Boxes, Fabric or Leatherette Covered)

BOXES, METAL EDGE

For editorial information, see Section 6

Andre Paper Box Co., San Francisco
Collett Sproule Boxes Ltd., Toronto, Ont.
Container Corp. of America, Chicago
Fleishhacker Paper Box Co., San Leandro, Calif.
Forsberg Paper Box Co., Madison, Wis.
Lansky Die Cutting Corp., New York
Metal Box Co., Ltd., London, England
National Metal Edge Box Co., Philadelphia
Nelson, B. F., Mfg. Co., Minneapolis
Rhoades Paper Box Co., Springfield, Ohio
Robertson Paper Box Co., Montville, Conn.
Seasongood Folding Box Co., Harrison, Ohio
Spitzer Paper Box Co., Toledo, Ohio
•Venesta Ltd., London, England
Zumbiel, C. W., Co., Cincinnati

BOXES, METAL LITHOGRAPHED & EMBOSSED

For editorial information, see Section 9

•Anchor Hocking Glass Corp., Lancaster, Ohio
•Atlantic Can Co., Delawanna, N. J.
Baltimore Metal Products, Inc., Brooklyn, N. Y.
•Burdick & Son, Inc., Albany, N. Y.
Clark, J. L., Mfg. Co., Rockford, Ill.
Columbia Can Co., Maspeth, N. Y.
Continental Can Co., Metal Div., New York
•Crown Cork & Seal Co., Can Div., Philadelphia
Daher Co., New York
Ellis, George D., & Sons, Inc., Philadelphia
Empire Can Corp., Brooklyn, N. Y.
•Frank, Walter, Elmhurst, Ill.
Heekin Can Co., Cincinnati
•I. D. Company, New York
Krause, Frederick A., Associates, Inc., Frenchtown, N. J.

Metal Box Co., Ltd., London, England
Milton, George A., Can Co., Brooklyn, N. Y.
•National Can Corp., Chicago
Olive Can Co., Chicago
Pioneer Can Co., Clifton, N. J.
Sterling Seal Co., Erie, Pa.
Williams, Gabriel, Co., Brooklyn, N. Y.

BOXES, METAL SPECIALTIES

(For Mascara, Cosmetics, Compacts, Etc.)

For editorial inforamtion, see Sections 9, 16

•Anchor Hocking Glass Corp., Lancaster, Ohio
•Burdick & Son, Inc., Albany, N. Y.
Clark, J. L., Mfg. Co., Rockford, Ill.
Evelet Specialty Co., Waterbury, Conn.
•Frank, Walter, Elmhurst, Ill.
Milton, George A., Can Co., Brooklyn, N. Y.
Metal Box Co., Ltd., London, England
•National Can Corp., Chicago
Pioneer Can Co., Clifton, N. J.
Richford Corp., New York
Scovill Mfg. Co., Waterbury, Conn.

BOXES, MOLDED PLASTIC, STOCK

For editorial information, see Section 8

A. J. & K. Co., Colchester, Conn.
•Arrow Mfg. Co., West New York, N. J.
Artcraft Paper Box Co., Los Angeles
Associated Plastic Companies, Inc., Midland, Mich.
•Bradley Associates, Inc., Chicago
Braun-Crystal Mfg. Co., Middle Village, N. Y.
Central Plastic Corp., Leominster, Mass.
Columbus Plastic Products, Inc., Columbus, Ohio
Como Plastics, Inc., Columbus, Ind.
Connecticut Plastic Products Co., Waterbury, Conn.
Crown Cork & Seal Co., Specialty Div., St. Louis, Mo.
D & D Plastics, Inc., Van Dyke, Mich.
•Davis, Joseph, Plastics Co., Arlington, N. J.
Emeloid Co., Hillside, N. J.
Federal Tool Corp., Chicago
Flyndustries, Inc., New York
Foster Grant Co., Leominster, Mass.
•Frank, Walter, Elmhurst, Ill.
Franklin Plastics, Inc., Franklin, Pa.
Gemloid Corp., Elmhurst, N. Y.
•Gilbert Plastics, Inc., Hillside, N. J.
•Hake Plastic Box Corp., Roanoke, Va.
Harkin Affiliates, Inc., New York
Harmon, Ira, Co., New York
Jones, Jesse, Box Corp., Philadelphia
King Plastic Products Corp., College Point, N. Y.
Kordite Corp., Macedon, N. Y.
Landsberger Co., New York
Maryland Plastics, Inc., New York
Massachusetts Plastic Corp., Ludlow, Mass.
Mehl Mfg. Co., Cincinnati
Mid-America Plastics, Inc., Cleveland
Moonglow Novelty Corp., New York
Mutual Plastic Mold Co., South Gate, Calif.
Nalle Plastics, Inc., Austin, Texas
National Spangle Corp., New York
Northeastern Plastics, Inc., Boston
Northwestern Paper Box Co., Seattle, Wash.
Norton Laboratories, Inc., Lockport, N. Y.
Olympic Plastics Co., Los Angeles
Oppenheim Co., New York
Peoria Plastic Co., E. Peoria, Ill.
Plastal Specialties Co., Seattle, Wash.
•Plastic Artisans, Inc., White Plains, N. Y.
Plasti-Pak Containers, Ltd., Toronto, Ont.
Plastomatic Corp., Malvern, Pa.
Polygon Products Co., Chicago
Rathbun Molding Co., Salamanca, N. Y.
Shoe Form Co., Auburn, N. Y.
Sillcocks-Miller Co., Maplewood, N. J.
Southern California Plastic Co., Glendale, Calif.
Southern Plastics Co., Columbia, S. C.
•Tri-State Plastic Molding Co., Henderson, Ky.
•Tupper Corp., Blackstone, Mass.
Universal Jewelry Case Co., Chicopee, Mass.
•Vlchek Tool Co., Cleveland
Wilpet Tool & Mfg. Co., Kearny, N. J.

BOXES, NAILED WOODEN

For editorial information, see Section 17

American Box Co., Sub. American Wood Products Corp., Cleveland
Autocraft Box Corp., York, Pa.
Bigelow-Garvey Lumber Co., Chicago
Bogert & Hopper, Inc., New York
Cozier Container Corp., Cleveland
Dreyer, H. D., & Co., Baltimore, Md.
Dunning, J. H., Corp., Darien, Conn.
Fichte, Otto F., & Son, Hollis, N. Y.
General Box Co., Des Plaines, Ill.
Gould, Jerome F., Corp., Brooklyn, N. Y.
Hines Pallet Co., Mount Airy, N. C.
Indianapolis Wire Bound Box Co., Indianapolis
Lange & Crist Box & Lumber Co., Clarksburg, W. Va.
Main Brothers Box & Lumber Co., Karnak, Ill.
Martin Brothers Box Co., Toledo, Ohio
National Pallet Corp., Pittsburgh
Nelson Co., Baltimore, Md.
Rock Mfg. Co., Stoughton, Mass.
Seattle Box Co., Seattle, Wash.
Skill-Craft, Inc., Akron, Ohio
South Bend Box Co., Div. General Building Materials, Inc., South Bend, Ind.
Southern Lumber & Mfg. Co., Ellijay, Ga.
Specification Packaging Engineering Corp., Burbank, Calif.
Standard Box Co., Pittsburgh
Sterling Lumber & Supply Co., Chicago
Timber Products Co., Medford, Ore.
Townson, W. D., Lumber Co., Murphy, N. C.
Utility Crate Corp., Los Angeles
•Venesta Ltd., London, England
Whiting, David, & Sons, Wilton, N. H.
Williamsburg Millwork Corp., Williamsburg, Va.

BOXES, PAPER SET-UP

For editorial information, see Section 6

AAAAAA-Ace Paper Box Corp., New York
Abana Products, Inc., Chicago
Acme Paper Box Co., San Francisco
Advance Paper Box Co., Los Angeles
Ainslie Co., Spokane, Wash.
Alderman Paper Box Corp., Rochester, N. Y.
Alsten Co., New York
American Tri-State Paper Box Co., Nashville, Tenn.
Apex Paper Box Corp., Chicago
Artcraft Paper Box Co., Los Angeles
Athol Paper Box Mfg. Co., Athol, Mass.
Atlantic Paper Box Co., Boston
Atlas Paper Box Co., Chattanooga, Tenn.
Autocraft Box Corp., York, Pa.
Avalon Paper Box Co., Los Angeles
Barnett, Samuel, Co., Philadelphia
Bay Cities Paperbox Co., Oakland, Calif.
Bechtold, C. B., Co., Philadelphia
Birmingham Paper Co., Birmingham, Ala.
Box Shop, Inc., New Haven, Conn.
Boxcraft Paper Box Co., Oakland, Calif.
Bradley & Gilbert Co., Louisville, Ky.
Brick & Ballerstein, Inc., Long Island City, N. Y.
Bristol Paper Box Co., Bristol, Va.
Buffinton Made-Rite Box Co., Providence, R. I.
Burnett, R. L., Co., San Antonio, Texas
•Burt, F. N., Co., Buffalo, N. Y.
Burton Packaging Co., New York
C & M Mfg. Co., Providence, R. I.
Cambridge Paper Box Co., Cambridge, Mass.
Casco Paper Box Co., Portland, Maine
Casselman, T. & E., Inc., New York
Central Fibre Products Co., Quincy, Ill.
Central Paper Box Co., Lancaster, Pa.
•Chaspec Mfg. Co., Greenwich, Conn.
Collett Sproule Boxes Ltd., Toronto, Ont.
Columbus Paper Box Co., Columbus, Ohio
Comly-Gillam Carton Corp., Philadelphia
Congress Paper Box Co., Chicago
Consolidated Box Co., Tampa, Fla.
Consolidated Paper Box Co., Somerville, Mass.
Courtland Box Co., Columbus, Ga.
Danbury Square Box Co., Danbury, Conn.
Davis, S. H., Paper Box Co., Toledo, Ohio
Day Mfg. Co., Sherman, Texas
Deline, I. A., Paper Boxes, Inc., Denver, Colo.
Delta Paper Box Co., Stockton, Calif.
•Dennison Mfg. Co., Framingham, Mass.
Devon Products, Inc., New York
Dubuque Container Co., Dubuque, Iowa
Earlville Paper Box Co., Earlville, N. Y.
Essex Paper Box Mfg. Co., Newark, N. J.
Feder Industries, Inc., New York
Fitzhugh, William W., Inc., New York
Fleishhacker Paper Box Co., San Leandro, Calif.
Flower City Specialty Co., Rochester, N. Y.
Forsberg Paper Box Co., Madison, Wis.
Frankenberg Bros., Inc., Columbus, Ohio
Fretz Box Co., Souderton, Pa.
Friend Box Co., Danvers, Mass.
General Box Co., Des Plaines, Ill.
Gerbereux, Dufft & Kinder, Brooklyn, N. Y.
Globe Paper Box Co., Chicago
Gordon, L., & Son, Inc., Baltimore, Md.
Greenfield Paper Box Co., Greenfield, Mass.
Heminway Corp., Waterbury, Conn.
Henry, Ira L., Co., Watertown, Wis.
Henry's Paper Products Co., Pittsfield, Mass.
Heywood Mfg. Co., Minneapolis
Imperial Paper Box Corp., Brooklyn, N. Y.
•Indianapolis Paper Container Corp., Indianapolis
Jones, Jesse, Box Corp., Philadelphia
Kalamazoo Paper Box Co., Kalamazoo, Mich.
Keystone Paper Box Co., York, Pa.
Kiernan-Hughes Co., Jersey City, N. J.
Kresge Paper Box Co., Bethlehem, Pa.
Kroeck Paper Box Co., Chicago
Landowne, J., Co., Brooklyn, N. Y.
Landsberger Co., New York
Lengsfield Brothers, Inc., New Orleans, La.
•Lebanon Paper Box Co., Lebanon, Pa.
Leominster Paper Box Co., Leominster, Mass.
Liberty Paper Box Co., Winona, Minn.
Livingston & Co., New York
Maderite Paper Box Co., Winsted, Conn.
Magnolia Paper Co., Box Div., Houston, Texas
Manchester Paper Boxes, Ltd., Toronto, Ont.
Mankato Paper Box Co., Mankato, Minn.
Mansfield Paper Box & Novelty Co., Mansfield, Ohio
Manufacturers Box Co., Bridgeport, Conn.
Martin Paper Box Mfg. Corp., Brooklyn, N. Y.
Maryland Plastics, Inc., New York
Mason Box Co., Attleboro, Mass.
Master Paper Box Co., Chicago
•Miller, Walter P., Co., Philadelphia
•Miro Container Corp., Brooklyn, N. Y.
Modern Boxes, Inc., Chicago, Ill.
Molitor Box Co., Milwaukee

Mount Joy Paper Box Co., Mount Joy, Pa.
Mullery Paper Packages, Inc., St. Paul, Minn.
Nashua Paper Box Co., Nashua, N. H.
National Paper Box Mfg. Co., Philadelphia
New Jersey Partition & Box Co., Newark, N. J.
New York Label & Box Corp., New York
Newark Paper Box Co., Newark, N. J.
Newth-Morris Box Corp. of Tenn., Milan, Tenn.
Niagara Box Factory, Inc., New York
Northwestern Paper Box Co., Seattle, Wash.
Norristown Box Co., Norristown, Pa.
Novel Enterprises, Brooklyn, N. Y.
•Old Dominion Box Co., Charlotte, N. C.
Pacific Paper Box Co., Los Angeles
Pacific Paper Box Co., Portland, Ore.
Papercraft Boxes, Inc., Los Angeles
Paper Package Co., Indianapolis
Paragon Box Co., Atlanta, Ga.
Pictorial Paper Package Corp., Aurora, Ill.
Piqua Paper Box Co., Piqua, Ohio
Pohlig Brothers, Inc., Richmond, Va.
Puget Sound Paper Box Co., Seattle, Wash.
Quality Park Box Co., St. Paul, Minn.
Quincy Paper Box Co., Quincy, Ill.
Ranburn Co., Inc., Tonawanda, N. Y.
Rappaport, S., Inc., New York
Reliance Paper Box Co., Philadelphia
Rhoades Paper Box Co., Springfield, Ohio
Ritchie, W. C., & Co., Chicago
•Rowell, E. N., Co., Batavia, N. Y.
St. Regis Paper Co., New York
San Diego Paper Box Co., San Diego, Calif.
San Jose Paper Box Co., Santa Clara, Calif.
Schmidt, Henry, & Bro., Inc., Philadelphia
Shadur Box Co., Milwaukee
Shaw Paper Box Co., Pawtucket, R. I.
•Shaw-Randall Co., Pawtucket, R. I.
Sheboygan Paper Box Co., Sheboygan, Wis.
Shelby Paper Box Co., Cleveland
Shoup-Owens, Inc., Hoboken, N. J.
Sidney Paper Box Co., Blanchester, Ohio
•Simplex Paper Box Corp., Lancaster, Pa.
Snyder, George H., Inc., Philadelphia
Southern Paper Box Co., Little Rock, Ark.
Sparks Corp., Philadelphia
Sparks, J. V., Inc., Long Beach, Calif.
Specialty Paper Box Co., Los Angeles
Spitzer Paper Box Co., Toledo, Ohio
Stecker Paper Box Co., Detroit
Strouse Adler Co., New Haven, Conn.
Stylepak Box Corp., Los Angeles
Tarshis, Nathan L., New York
Taylor Box Co., Warren, R. I.
Trilsch, Oscar, Co., Whitestone, N. Y.
United Paper Box Co., San Francisco
United Paper Box Corp., Chicago
Universal Jewelry Case Co., Chicopee, Mass.
Van Ness Bros., Inc., Paterson, N. J.
Voss, Karl, Corp., Hoboken, N. J.
Wallace Paper Box Corp., Maspeth, N. Y.
Warder Paper Box Co., Niagara Falls, N. Y.
Warneke Paper Box Co., Denver, Colo.
•Warner Bros. Co., Bridgeport, Conn.
Weil & Newman, Inc., Brooklyn, N. Y.
Western Paper Box Co., Oakland, Calif.
Wilkins Paper Box Co., Boston
Williams Bros. Paper Box Co., St. Joseph, Mich.
Wilson Paper Box Co., Richmond, Va.
Winona Paper Box Co., Los Angeles
Youse, C. J., Co. of Baltimore City, Baltimore, Md.
Zumbiel, C. W., Co., Cincinnati

BOXES, RIGID TRANSPARENT

(See Containers, Rigid Transparent, Fabricated from Sheet; also Boxes, Molded Plastic, Stock)

BOXES, SHIPPING

(See Containers, Corrugated; Containers, Shipping)

BOXES, TRANSPARENT SET-UP

(See Containers, Rigid Transparent, Fabricated from Sheet)

BOXES, WIREBOUND WOODEN

For editorial information, see Section 17

American Box Co., Sub. American Wood Products Corp., Cleveland
Atlas Plywood Corp., Boston
Bogert & Hopper, Inc., New York
Cozier Container Corp., Cleveland
Dunning, J. H., Corp., Darien, Conn.
General Box Co., Des Plaines, Ill.
Indianapolis Wire Bound Box Co., Indianapolis
Lange & Crist Box & Lumber Co., Clarksburg, W. Va.
Lea, David M., & Co., Richmond, Va.
Main Bros. Box & Lumber Co., Karnak, Ill.
Martin Brothers Box Co., Toledo, Ohio
Producers Exchange, Inc., Toledo, Ohio
South Bend Box Co., Div. General Building Materials, Inc., South Bend, Ind.
Talley's Veneer & Crate Co., Adel, Ga.
Wadley Veneer & Box Co., Wadley, Ga.

BOXES, WOOD, COVERED

(Fabric, Leatherette, Etc.)

(See Boxes, Fabric or Leatherette Covered)

BOXES & BASKETS, FRUIT & VEGETABLE

For editorial information, see Section 17

Andre Paper Box Co., San Francisco
Ames Bag Co., Selma, Ala.
Bowaters Sales Co., London, England
Can-Pro Corp., Fond du Lac, Wis.
Chaffee Brothers Co., Oxford, Mass.
Claremould Plastics Co., Newark, N. J.
Container Corp. of America, Chicago
Continental Paper Products Co., Denver, Colo.
Corro, Ltd., New York
•Fibreboard Products, Inc., San Francisco
•Gilbert Plastics, Inc., Hillside, N. J.
•Hinde & Dauch, Sandusky, Ohio
•Inland Container Corp., Indianapolis
Lengsfield Brothers, Inc., New Orleans, La.
Main Bros. Box & Lumber Co., Karnak, Ill.
Massachusetts Plastic Corp., Ludlow, Mass.
Olympic Plastics Co., Los Angeles
Ottawa River Paper Co., Toledo, Ohio
Producers Exchange, Inc., Toledo, Ohio
Seattle Box Co., Seattle, Wash.
Universal Folding Box Co., Hoboken, N. J.
Williams, Gabriel, Co., Brooklyn, N. Y.

CADDIES, CRACKERS

For editorial information, see Sections 6, 16

Ainslie Co., Spokane, Wash.
Coates Board & Carton Co., Garfield, N. J.
Crescent Box Corp., Philadelphia
Crook Paper Box Co., No. Kansas City, Mo.
Daher Co., New York
Fitzhugh, William W., Inc., New York
Grand City Container Corp., No. Bergen, N. J.
Green Bay Box Co., Green Bay, Wis.
Lawson & Jones Ltd., London, Ont.
Metal Box Co., Ltd., London, England
Northeastern Plastics, Inc., Boston
Ritchie, W. C., & Co., Chicago
San Diego Paper Box Co., San Diego, Calif.
•United Board & Carton Corp., New York
Universal Folding Box Co., Hoboken, N. J.

CANS, AEROSOL

For editorial information, see Section 9

Aerated Container Corp., Chicago
American Can Co., New York
American Metal Products Co., Bridgeport, Conn.
Continental Can Co., Metal Div., New York
•Crown Cork & Seal Co., Can Div., Philadelphia
•Peerless Tube Co., Bloomfield, N. J.
Ronor Corp., Cleveland
•Sunex, Div. Sun Tube Corp., Hillside, N. J.
White Metal Mfg. Co., Hoboken, N. J.

CANS, EXTRUDED, ROUND

(Aluminum, Lead, Tin)

For editorial information, see Section 9

American Can Co., New York
Art Tube Co., Irvington, N. J.
•Crown Cork & Seal Co., Can Div., Philadelphia
Ellis, George D., & Sons, Inc., Philadelphia
•Frank, Walter, Elumhurst, Ill.
Metal Box Co., Ltd., London, England
•Sun Tube Corp., Hillside, N. J.
Taranger, E., Inc., New York
•Venesta Ltd., London, England
Victor Metal Products Corp., Newport, Ark.
Vulcan Containers, Inc., Bellwood, Ill.
White Metal Mfg. Co., Hoboken, N. J.

CANS, FABRIC COVERED

For editorial information, see Section 16

Ames Bag Co., Selma, Ala.
Corygnton Products Co., Div. Shoup-Owens, Inc., Hoboken, N. J.
Krause, Frederick A., Associates, Inc., Frenchtown, N. J.
Universal Tube & Container Co., Waltham, Mass.

CANS, FIBRE & COMPOSITE

For editorial information, see Section 6

American Can Co., New York
Ames Bag Co., Selma, Ala.
•Burt, F. N., Co., Buffalo, N. Y.
Cambridge Paper Box Co., Cambridge, Mass.
Chicago Mailing Tube Co., Chicago
Cin-Made Corp., Cincinnati
•Cleveland Container Co., Cleveland
Consolidated Box Co., Tampa, Fla.
Container Corp. of America, Chicago
Corygnton Products Co., Div. Shoup-Owens, Inc., Hoboken, N. J.
Crescent Paper Tube Co., Covington, Ky.
•Cross Paper Products Corp., New York
Globe Container Co., San Carlos, Calif.
•Harcord Mfg. Co., Jersey City, N. J.
Improved Mailing Case Co., New York
•Indianapolis Paper Container Corp., Indianapolis
Industrial Steel & Fibre Ltd., Terrebonne, Que.
Marshall Paper Tube Co., Randolph, Mass.
•Middlesex Paper Tube Co., Lowell, Mass.
Mitchell Paper Products Co., Bloomfield, N. J.

Mallery Paper Packages, Inc., St. Paul, Minn.
New York Label & Box Corp., New York
•Niemand Bros., Inc., Long Island City, N. Y.
Ohio Paper Products Co., Massillon, Ohio
Packard Container Corp., Hoboken, N. J.
Platt Corp., Baltimore, Md.
•R. C. Can Co., St. Louis, Mo.
Ritchie, W. C., & Co., Chicago
•Sefton Fibre Can Co., St. Louis, Mo.
Sonoco Products Co., Hartsville, S. C.
Spenzer Container Corp., Greenville, Pa.
Stecker Paper Box Co., Detroit
•United Can Co., Phillipsburg, N. J.
Universal Tube & Container Co., Waltham, Mass.

CANS, METAL

For editorial information, see Section 9

American Can Co., New York
•Atlantic Can Co., Delawanna, N. J.
Baltimore Metal Products, Brooklyn, N. Y.
Bennett Industries, Inc., Peotone, Ill.
•Burdick & Son, Inc., Albany, N. Y.
Central States Can Corp., Massillon, Ohio
Clark, J. L., Mfg. Co., Rockford, Ill.
Columbia Can Co., Maspeth, N. Y.
Conneaut Can Co., Conneaut, Ohio
Continental Can Co., Metal Div., New York
•Crown Cork & Seal Co., Can Div., Philadelphia
Ellis, George D., & Sons, Inc., Philadelphia
Empire Can Corp., Brooklyn, N. Y.
Federal Tin Co., Baltimore, Md.
Geuder, Paeschke & Frey Co., Milwaukee
Heekin Can Co., Cincinnati
•I. D. Company, New York
Inland Steel Container Co., Div. Inland Steel Co., Chicago
Krause, Frederick A., Associates, Inc., Frenchtown, N. J.
Metal Box Co., London, England
Milton, George A., Can Co., Brooklyn, N. Y.
•National Can Corp., Chicago
National Tin Can Mfy. Co., New York
Olive Can Co., Chicago
Pioneer Can Co., Clifton, N. J.
Pletcher & Pollack, New York
Southline Metal Products Co., Houston, Texas
Steel & Tin Products Co., Baltimore, Md.
Sterling Seal Co., Erie, Pa.
Taranger, E., Inc., New York
Thompson Can Co., Dallas, Texas
Van Leer's Vatenfabrieken N. V., Amsterdam, Holland
•Venesta Ltd., London, England
Vulcan Containers, Inc., Bellwood, Ill.
Vulcan Containers Ltd., Toronto, Ont.
Vulcan Steel Container Co., Birmingham, Ala.
White Metal Mfg. Co., Hoboken, N. J.

CANS, PAPER

(For Bulk Ice Cream)

For editorial information, see Section 6

Cambridge Paper Box Co., Cambridge, Mass.
Continental Can Co., Paper Container Div., Newark, N. J.
•Fibreboard Products, Inc., San Francisco
Fonda Container Co., St. Albans, Vt.
•Morris Paper Mills, Chicago
•National Folding Box Co., Sub. Federal Paper Board Co., New York
Sealright Co., Fulton, N. Y.
Summit Container Co., Chicago
•Sutherland Paper Co., Kalamazoo, Mich.
•United Can Co., Phillipsburg, N. J.

CAPSULES

A. Gelatin seamless
B. Plastic two-piece

For editorial information, see Section 7

•Bradley Associates, Inc., Chicago (B)
Falge Engineering Corp., Bethesda, Md. (B)
Gelatin Products Div., R. P. Scherer Corp., Detroit (A)
•Lermer Plastics, Inc., Garwood, N. J. (B)
PharmaPlastics, Inc., Baltimore, Md. (B)

CARBOYS

For editorial information, see Section 17

Atlantic Glass Co., Baltimore, Md.
•Bradley Associates, Inc., Chicago
Corning Glass Works, Corning, N. Y.
•Erno Products Co., Philadelphia
Gayner Glass Works, Inc., Salem, N. J.
•Owens-Illinois Glass Co., Toledo, Ohio
Ross Container & Seal Co., New York
Whiting, David, & Sons, Wilton, N. H.

CARTONS, CAN & BOTTLE CARRIERS

For editorial information, see Section 6

AAAAAA-Ace Paper Box Corp., New York
•Ace Carton Corp., Chicago
Ace Folding Box Corp., White Pigeon, Mich.
Acme Paper Box Co., San Francisco
Ainslie Co., Spokane, Wash.
Alford Cartons, Div. Continental Paper Co., Ridgefield Park, N. J.
Alton Boxmakers, Inc., St. Louis, Mo.
Andre Paper Box Co., San Francisco
Atlanta Paper Co., Atlanta, Ga.
•Atlas-Boxmakers, Inc., Chicago
Bradley & Gilbert Co., Louisville, Ky.
•Brooks & Porter, Inc., New York
Burton Packaging Co., New York
Central Fibre Products Co., Quincy, Ill.
•Chicago Carton Co., Chicago
Clark, J. L., Mfg. Co., Rockford, Ill.
Coates Board & Carton Co., Garfield, N. J.
Consolidated Box Co., Tampa, Fla.
Consolidated Paper Co., Monroe, Mich.
Container Corp. of America, Chicago
Continental Paper Products Co., Denver, Colo.
Cornell Paperboard Products Co., Milwaukee
Crook Paper Box Co., No. Kansas City, Mo.
Dacam Corp., Charlotte, N. C.
Downingtown Paper Box Co., Downingtown, Pa.
Empire Box Corp., Chicago
•Fibreboard Products, Inc., San Francisco
Fitzhugh, William W., Inc., New York
Franklyn Folding Box Co., Maspeth, N. Y.
•Gair, Robert, Co., New York
•Gaylord Container Corp., St. Louis, Mo.
Gardner Board & Carton Co., Middletown, Ohio
Gereke-Allen Carton Co., Div. Eddy Paper Corp., St. Louis, Mo.
Grand City Container Corp., No. Bergen, N. J.
Hygrade Folding Box Corp., Woodhaven, N. Y.
•Indianapolis Paper Container Corp., Indianapolis
Interstate Folding Box Co., Middletown, Ohio
Lawson & Jones, Ltd., London, Ont.
Lengsfield Brothers, Inc., New Orleans, La.
Liberty Corrugated Container Corp., Brooklyn, N. Y.
Magnolia Paper Co., Box Div., Houston, Texas
Metal Box Co., Ltd., London, England
•Michigan Carton Co., Battle Creek, Mich.
•Milprint, Inc., Milwaukee
•Morris Paper Mills, Chicago
•National Folding Box Co., Sub. Federal Paper Board Co., New York
New Haven Board & Carton Co., New Haven, Conn.
•Ohio Boxboard Co., Rittman, Ohio
•Old Dominion Box Co., Charlotte, N. C.
Pollock Paper Corp., Div. St. Regis Paper Co., Dallas, Texas.
Ritchie, W. C., & Co., Chicago
Schmidt Lithograph Co., San Francisco
•Schoettle, Edwin J., Co., Philadelphia
Seasongood Folding Box Co., Harrison, Ohio
Security Carton Co., Mobile, Ala.
Spear Box Co., New York
Srofe, Jesse, Cincinnati
Sturgis Cartons, Inc., Sturgis, Mich.
•Sutherland Paper Co., Kalamazoo, Mich.
•United Board & Carton Corp., New York
•U. S. Printing & Lithograph Co., Cincinnati
Universal Folding Box Co., Hoboken, N. J.
Van Vick Paper Box Co., Duluth, Minn.
Waldorf Paper Products Co., St. Paul, Minn.
Wolverine Carton Co., Grand Rapids, Mich.

CARTONS, FOLDING & DISPLAY

(Folding Boxes)

For editorial information, see Section 6

AAAAAA-Ace Paper Box Corp., New York
Abana Products, Inc., Chicago
•Ace Carton Corp., Chicago
Ace Folding Box Corp., White Pigeon, Mich.
Acme Folding Box Co., New York
Acme Paper Box Co., San Francisco
Advance Paper Box Co., Los Angeles
Ainslie Co., Spokane, Wash.
Alford Cartons, Div. Continental Paper Co., Ridgefield Park, N. J.
Alton Boxmakers, Inc., St. Louis, Mo.
Aluminum Rolling Mills, Ltd., Cap-de-la-Madeleine, Que.
American Box Co., Sub., American Wood Products Corp., Cleveland
American Carton Wrapper Co., Chicago
American Die & Box Co., Denver, Colo.
American Tri-State Paper Box Co., Nashville, Tenn.
Atlanta Paper Co., Atlanta, Ga.
•Atlas-Boxmakers, Inc., Chicago
Bay Cities Paper Box Co., Oakland, Calif.
•Berles Carton Co., Paterson, N. J.
Bestpak, Inc., Natick, Mass.
Birmingham Paper Co., Birmingham, Ala.
Bloomer Bros. Co., Newark, N. Y.
Blum Folding Paper Box Co., Valley Stream, N. Y.
Bradley & Gilbert Co., Louisville, Ky.
Brooks Co., Springfield, Mass.
•Brooks & Porter, Inc., New York
Brown & Bailey Co., Philadelphia
Bruce Carton Co., Memphis, Tenn.
Burgess & Why Corp., Philadelphia
Burnett, R. L., Co., San Antonio, Texas
•Burt, F. N., Co., Buffalo, N. Y.
Burton Packaging Co., New York
C & M Mfg. Co., Providence, R. I.
Cambridge Paper Box Co., Cambridge, Mass.
Carton Craftsmen, Inc., Chicago
Carton Service, Inc., Shelby, Ohio
Central Fibre Products Co., Quincy, Ill.
•Chicago Carton Co., Chicago
Climax Mfg. Co., Castorland, N. Y.
Coates Board & Carton Co., Garfield, N. J.
Colgate, Wm. Homer, West Redding, Conn.
Collett Sproule Boxes Ltd., Toronto, Ont.
Columbus Paper Box Co., Columbus, Ohio

Comly-Gillam Carton Corp., Philadelphia
Consolidated Box Co., Tampa, Fla.
Consolidated Lithograph Div., Somerville, Ltd., Montreal, Que.
Consolidated Paper Co., Monroe, Mich.
Container Corp. of America, Chicago
Continental Folding Paper Box Co., Ridgefield, N. J.
Continental Paper Products Co., Denver, Colo.
Cornell Paperboard Products Co., Milwaukee
Courtland Box Co., Columbus, Ga.
Crescent Box Corp., Philadelphia
•Crocker, H. S., Co., San Bruno, Calif.
Crook Paper Box Co., No. Kansas City, Mo.
Crowell Carton Co., Marshall, Mich.
Curtis, S., & Son, Inc., Sandy Hook, Conn.
Day Mfg. Co., Sherman, Texas
Delta Paper Box Co., Stockton, Calif.
Devon Products, Inc., New York
Dickinson, John, & Co., Hemel Hempstead, Herts., England
•Donrico, Inc., New York
Downingtown Paper Box Co., Downingtown, Pa.
Dubuque Container Co., Dubuque, Iowa
Edwards Folding Box Co., Philadelphia
Empire Box Corp., Chicago
Essex Paper Box Mfg. Co., Newark, N. J.
Feder Industries, Inc., New York
Federal Carton Corp., No. Bergen, N. J.
•Fibreboard Products, Inc., San Francisco
Fitzhugh, William W., Inc., New York
Fleishhacker Paper Box Co., San Leandro, Calif.
Flintkote Co., Pioneer Div., Los Angeles
Flower City Specialty Co., Rochester, N. Y.
Forsberg Paper Box Co., Madison, Wis.
•Frank, Walter, Elmhurst, Ill.
Franklyn Folding Box Co., Maspeth, N. Y.
•Gair, Robert, Co., New York
Gardner Board & Carton Co., Middletown, Ohio
•Gaylord Container Corp., St. Louis, Mo.
General Carton Co., Cleveland
Gerald Carton Co., Brooklyn, N. Y.
Gereke-Allen Carton Co., Div. Eddy Paper Corp., St. Louis, Mo.
•Gordon Cartons, Inc., Baltimore, Md.
Green Bay Box Co., Green Bay, Wis.
Heywood Mfg. Co., Minneapolis
Hilsher Paper Box Co., Kingston, Pa.
House of Harley, Inc., New York
•Howell, F. M., & Co., Elmira, N. Y.
Hygrade Folding Box Corp., Woodhaven, N. Y.
•Indianapolis Paper Container Corp., Indianapolis
Industrial Packaging Co., Ridgefield Park, N. J.
•Inman Mfg. Co., Amsterdam, N. Y.
•International Folding Paper Box Co., No. Bergen, N. J.
Interstate Folding Box Co., Middletown, Ohio
Keystone Folding Box Co., Newark, N. J.
Keystone Paper Box Co., York, Pa.
Kroeck Paper Box Co., Chicago
Lawson & Jones, Ltd., London, Ont.
•Lebanon Paper Box Co., Lebanon, Pa.
Lengsfield Brothers, Inc., New Orleans, La.
Lewy, Morris L., & Co., New York
Lord Baltimore Press, Baltimore, Md.
Magnolia Paper Co., Box Div., Houston, Texas
Manchester Paper Boxes, Ltd., Toronto, Ont.
Mankato Paper Box Co., Mankato, Minn.
Manufacturers Box Co., Bridgeport, Conn.
Maryland Paper Box Co., Baltimore, Md.
Master Cartons, Inc., So. San Gabriel, Calif.
Merchandise Press, Inc., New York
Metal Box Co., Ltd., London, England
•Michigan Carton Co., Battle Creek, Mich.
•Milprint, Inc., Milwaukee
•Morris Paper Mills, Chicago
Mullery Paper Packages, Inc., St. Paul, Minn.
•National Folding Box Co., Sub. Federal Paper Board Co., New York
National Paper Box Mfg. Co., Philadelphia
Nebel Paper Products Co., Charlotte, N. C.
Nelson, B. F., Mfg. Co., Minneapolis
Nevins Co., Clifton, N. J.
New Haven Board & Carton Co., New Haven, Conn.
New York Label & Box Corp., New York
Northwestern Paper Box Co., Seattle, Wash.
Norristown Box Co., Norristown, Pa.
O'Connor Paper Box Co., Hollywood, Calif.
•Ohio Boxboard Co., Rittman, Ohio
•Old Dominion Box Co., Charlotte, N. C.
Orchard Paper Co., St. Louis, Mo.
Pacific Paper Box Co., Portland, Ore.
Packaging Corp. of America, Chicago
Peerless Packages, Inc., Cleveland
Pictorial Paper Package Corp., Aurora, Ill.
Pie-Pak Co., Hoboken, N. J.
Philadelphia Paper Co., Philadelphia
Pioneer Folding Box Co., Chicopee, Mass.
Pohlig Brothers, Inc., Richmond, Va.
Pollock Paper Corp., Div. St. Regis Paper Co., Dallas, Texas
R E B Trays, Inc., Philadelphia
Randolph Paper Box Corp., Richmond, Va.
•Richardson Taylor-Globe Corp., Cincinnati
Ritchie, W. C., & Co., Chicago
Robertson Paper Box Co., Montville, Conn.
Robinson, E. S. & A., (Canada), Ltd., Toronto, Ont.
Rochester Folding Box Co., Rochester, N. Y.
•Rondo American Corp., Hamden, Conn.
Rossotti Lithograph Corp., No. Bergen, N. J.
St. Regis Paper Co., New York
Sample—Durick Co., Chicopee, Mass.
San Diego Paper Box Co., San Diego, Calif.
Schiefer Folding Box Corp., Syracuse, N. Y.
Schmidt, Henry, & Bro., Inc., Philadelphia
Schmidt Lithograph Co., San Francisco
Schmitt, Charles J., Co., San Francisco
•Schoettle, Edwin J., Co., Philadelphia
Seasongood Folding Box Co., Harrison, Ohio
Security Carton Co., Mobile, Ala.
Service Folding Box Co., Brooklyn, N. Y.
Shadur Box Co., Milwaukee
•Shaw-Randall Co., Pawtucket, R. I.
Sheboygan Paper Box Co., Sheboygan, Wis.
Shelby Paper Box Co., Cleveland
•Simplex Paper Box Corp., Lancaster, Pa.
Southern Paper Box Co., Little Rock, Ark.
Sparks Corp., Philadelphia
Spear Box Co., New York
Spitzer Paper Box Co., Toledo, Ohio
Srofe, Jesse, Cincinnati
Standard Folding Trays Corp., Jackson Heights, N. Y.
Standard Paper Box Corp., Los Angeles
Stecher-Traung Lithograph Corp., Rochester, N. Y.
Stecker Paper Box Co., Detroit
Strange, John, Carton Co., Menasha, Wis.
Sturgis Cartons, Inc., Sturgis, Mich.
Superior Folding Box Co., St. Louis, Mo.
•Sutherland Paper Co., Kalamazoo, Mich.
Tower Container Corp., New York
Trenton Folding Box Co., Trenton, N. J.
Tri-Boro Carton Co., Brooklyn, N. Y.
Trum, E. J., Inc., Brooklyn, N. Y.
•United Board & Carton Corp., New York
United Carton Co., Chicago
•U. S. Printing & Lithograph Co., Cincinnati
Universal Folding Box Co., Hoboken, N. J.
Valpey Press, Malden, Mass.
Vanant Products, Tomah, Wis.
Van Vick Paper Box Co., Duluth, Minn.
Wagner Folding Box Corp., Buffalo, N. Y.
Wagner, Victor, & Son, Inc., Buffalo, N. Y.
Waldorf Paper Products Co., St. Paul, Minn.
Warneke Paper Box Co., Denver, Colo.
•Warner Bros. Co., Bridgeport, Conn.
Waters Co., Chicago
Wedgewood Press, Inc., New York
Weil's, David, Sons Lithographic Co., Brooklyn, N. Y.
Wells Badger Corp., Milwaukee
Western Paper Box Co., Oakland, Calif.
Whitney & Co., Leominster, Mass.
Wilkata Folding Box Co., Kearny, N. J.
Williams Bros. Paper Box Co., St. Joseph, Mich.
Wilson Paper Box Co., Richmond, Va.
Wolf Die Cutting Co., Brooklyn, N. Y.
Wolverine Carton Co., Grand Rapids, Mich.
Yorktowne Paper Mills, Inc., York, Pa.
Zumbiel, C. W., Co., Cincinnati

CARTONS, TRANSPARENT FOLDING

(All-Acetate)

For editorial information, see Section 8

•Gair, Robert, Co., New York

CARTONS, WAXED & PARAFFINED

For editorial information, see Section 6

AAAAAA-Ace Paper Box Corp., New York
•Ace Carton Corp., Chicago
Acme Paper Box Co., San Francisco
Ainslie Co., Spokane, Wash.
American Carton Wrapper Co., Chicago
Andre Paper Box Co., San Francisco
Atlanta Paper Co., Atlanta, Ga.
Bay Cities Paperbox Co., Oakland, Calif.
•Berles Carton Co., Paterson, N. J.
Birmingham Paper Co., Birmingham, Ala.
Bloomer Bros. Co., Newark, N. Y.
•Brooks & Porter, Inc., New York
Burnett, R. L., Co., San Antonio, Texas
Burton Packaging Co., New York
Butler Paper Products Co., Toledo, Ohio
Central Fibre Products Co., Quincy, Ill.
•Chicago Carton Co., Chicago
Climax Mfg. Co., Castorland, N. Y.
Collett Sproule Boxes Ltd., Toronto, Ont.
Consolidated Paper Co., Monroe, Mich.
Container Corp. of America, Chicago
Continental Paper Products Co., Denver, Colo.
•Crocker, H. S., Co., San Bruno, Calif.
Dubuque Container Co., Dubuque, Iowa
Empire Box Corp., Chicago
Federal Carton Corp., No. Bergen, N. J.
•Fibreboard Products, Inc., San Francisco
Fitzhugh, William W., Inc., New York
Fleishhacker Paper Box Co., San Leandro, Calif.
Flintkote Co., The Pioneer Div., Los Angeles
Forsberg Paper Box Co., Madison, Wis.
•Gair, Robert, Co., New York
Gardner Board & Carton Co., Middletown, Ohio
•Gaylord Container Corp., St. Louis, Mo.
General Foods Corp., Carton & Container Div., Battle Creek, Mich.
Gereke-Allen Carton Co., Div. Eddy Paper Corp., St. Louis, Mo.
Grand City Container Corp., No. Bergen, N. J.
•Indianapolis Paper Container Corp., Indianapolis
Lawless Bros. Container Corp., Tonawanda, N. Y.
Lawson & Jones Ltd., London, Ont.
Lord Baltimore Press, Baltimore, Md.
Magnolia Paper Co., Box Div., Houston, Texas

Manchester Paper Boxes, Ltd., Toronto, Ont.
•Marathon Corp., Menasha, Wis.
Maryland Paper Box Co., Baltimore, Md.
•Michigan Carton Co., Battle Creek, Mich.
•Milprint, Inc., Milwaukee
•Morris Paper Mills, Chicago
•National Folding Box Co., Sub. Federal Paper Board Co., New York
Nebel Paper Products Co., Charlotte, N. C.
New Haven Board & Carton Co., New Haven, Conn.
•Ohio Boxboard Co., Rittman, Ohio
Packaging Corp. of America, Chicago
Peerless Packages, Inc., Cleveland
Pollock Paper Corp., Div. St. Regis Paper Co., Dallas, Texas
Randolph Paper Box Corp., Richmond, Va.
•Richardson Taylor-Globe Corp., Cincinnati
San Diego Paper Box Co., San Diego, Calif.
Schoettle, Edwin J., Co., Philadelphia
Sheboygan Paper Box Co., Sheboygan, Wis.
Sparks Corp., Philadelphia
Spitzer Paper Box Co., Toledo, Ohio
Strange, John, Carton Co., Menasha, Wis.
•Sutherland Paper Co., Kalamazoo, Mich.
•United Board & Carton Corp., New York
Vanant Products, Tomah, Wis.
Wagner Folding Box Corp., Buffalo, N. Y.
Wagner, Victor, & Son, Inc., Buffalo, N. Y.
Waldorf Paper Products Co., St. Paul, Minn.
Wolverine Carton Co., Grand Rapids, Mich.

CHESTS

(See Boxes, Fabric or Leatherette Covered)

COLLAPSIBLE TUBES

(See Tubes, Collapsible)

CONTAINERS, ALUMINUM FOIL

For editorial information, see Section 9

Aluminum Foil Packaging Co., Ft. Madison, Iowa
Aluminum Rolling Mills, Ltd., Cap-de-la-Madeleine, Que.
American Pan Div., Cincinnati
Basca Mfg. Co., Div. of Huyler's, Indianapolis
•Brooks & Porter, Inc., New York
Burton Packaging Co., New York
Camp Mfg. Co., Franklin, Va.
Davis, S. H., Paper Box Co., Toledo, Ohio
Dura-Lee Corp., Kansas City, Mo.
Ekco Products Co., Chicago
Foil Kraft, Inc., Los Angeles
Foil Products, Inc., Winston-Salem, N. C.
Industrial Packaging Co., Ridgefield Park, N. J.
Lewy, Morris L., & Co., New York
Phoenix Industries, Inc., Indianapolis
Raisin, John T., Corp., San Francisco
•Reynolds Metals Co., Louisville, Ky.
•Richardson Taylor-Globe Corp., Cincinnati
Servon, Inc., New York
Spec-Fab Co., Philadelphia
•Sutherland Paper Co., Kalamazoo, Mich.
Zumbiel, C. W., Co., Cincinnati

CONTAINERS, CERAMIC, CLAY POTTERY

(See Pottery Containers)

CONTAINERS, CORRUGATED & SOLID FIBRE

For editorial information, see Section 17

AAAAAA-Ace Paper Box Corp., New York
Abana Products, Inc., Chicago
American Box Board Co., Grand Rapids, Mich.
American Box Co., Sub. American Wood Products Corp., Cleveland
American Carton Wrapper Co., Chicago
Atlanta Paper Co., Atlanta, Ga.
•Atlas-Boxmakers, Inc., Chicago
Bay Cities Paperbox Co., Oakland, Calif.
Birmingham Paper Co., Birmingham, Ala.
Boone Box Co., Louisville, Ky.
Bowaters Sales Co., London, England
Bristol Paper Box Co., Bristol, Va.
Brown Container Co., West Monroe, La.
Capital City Container Co., Albany, N. Y.
Central Fibre Products Co., Quincy, Ill.
Chippewa Paper Products Co., Chicago
Commercial Corrugated Container Corp., New York
Consolidated Paper Co., Monroe, Mich.
Container Corp. of America, Chicago
Cornell Paperboard Products Co., Milwaukee
Corro, Ltd., New York
Cozier Container Corp., Cleveland
Crescent Box Corp., Philadelphia
Crook Paper Box Co., No. Kansas City, Mo.
Danbury Square Box Co., Danbury, Conn.
Dixie Container Corp., Richmond, Va.
Dubuque Container Co., Dubuque, Iowa
Duo-Pak Containers Co., Sausalito, Calif.
Federal Container Corp., Minneapolis
•Fibreboard Products, Inc., San Francisco
Fitzhugh, William W., Inc., New York
Flintkote Co., The, Pioneer Div., Los Angeles
Forsberg Paper Box Co., Madison, Wis.
Fort Wayne Corrugated Paper Co., Fort Wayne, Ind.
•Gair, Robert, Co., New York
•Gaylord Container Corp., St. Louis, Mo.
General Box Co., Des Plaines, Ill.
General Foods Corp., Carton & Container Div., Battle Creek, Mich.
•Gibraltar Corrugated Paper Co., Inc., Display Div., Clifton, N. J.
Gould, Stephen, Paper Co., Jersey City, N. J.
Grand City Container Corp., No. Bergen, N. J.
Green Bay Box Co., Green Bay, Wis.
•Growers Container Corp., Salinas, Calif.
Hankins Container Co., Cleveland
•Hinde & Dauch, Sandusky, Ohio
Hoerner Boxes, Inc., Keokuk, Iowa
Hollinger Corp., Arlington, Va.
Industrial Container Corp., Brooklyn, N. Y.
•Inland Container Corp., Indianapolis
Kieckhefer Container Co., Camden, N. J.
Krafco Container Corp., Dallas, Texas
Kress, F. J., Box Co., Pittsburgh
Lawless Bros. Container Corp., Tonawanda, N. Y.
Liberty Corrugated Container Corp., Brooklyn, N. Y.
Liberty Paper Box Co., Winona, Minn.
Mengel Co., Louisville, Ky.
Merit Container Corp., New York
Midland Container Corp., St. Louis, Mo.
Mohawk Containers, Inc., New Hartford, N. Y.
•National Container Corp., New York
Nelson Co., Baltimore, Md.
Nelson, B. F., Mfg. Co., Minneapolis
New England Container Co., Chicopee, Mass.
•Ohio Boxboard Co., Rittman, Ohio
•Old Dominion Box Co., Charlotte, N. C.
Ottawa River Paper Co., Toledo, Ohio
•Owens-Illinois Glass Co., Toledo, Ohio
Pacific Paper Box Co., Portland, Ore.
Producers Exchange, Inc., Toledo, Ohio
•R. C. Can Co., St. Louis, Mo.
Raible, J. R., Co., Birmingham, Ala.
Reading Corrugated Container Corp., Reading, Pa.
River Raisin Paper Co., Monroe, Mich.
Rochester Folding Box Co., Rochester, N. Y.
St. Joe Paper Co., Houston Container Div., Houston, Texas
St. Regis Paper Co., New York
Schiffenhaus Bros., Newark, N. J.
Schmidt Lithograph Co., San Francisco
Shamrock Paper Co., St. Louis, Mo.
Sonoco Products Co., Hartsville, S. C.
Standard Corrugated Case Corp., Ridgefield, N. J.
Stone Container Corp., Chicago
Tillery Container Co., Kansas City, Mo.
Union Bag & Paper Corp., New York
•United Board & Carton Corp., New York
U. S. Corrugated Fibre Box Co., Indianapolis
Wabash Fibre Box Co., Terre Haute, Ind.
Waldorf Paper Products Co., St. Paul, Minn.
Wisconsin Container Corp., Menasha, Wis.
Wolf Die Cutting Co., Brooklyn, N. Y.

CONTAINERS, CORRUGATED & SOLID FIBRE WITH WOODEN FRAMES

For editorial information, see Section 17

American Box Co., Sub. American Wood Products Corp., Cleveland
Atlas Plywood Corp., Boston
Bigelow-Garvey Lumber Co., Chicago
Corro, Ltd., New York
Cozier Container Corp., Cleveland
Federal Container Corp., Minneapolis
General Box Co., Des Plaines, Ill.
Hollinger Corp., Arlington, Va.
Industrial Container Corp., Brooklyn, N. Y.
•Inland Container Corp., Indianapolis
Liberty Corrugated Container Corp., Brooklyn, N. Y.
Merit Container Corp., New York
Utility Crate Corp., Los Angeles
Waldorf Paper Products Co., St. Paul, Minn.

CONTAINERS, FLEXIBLE

(See Bags, also Envelopes)

CONTAINERS, INSULATED

(Bags, Cartons, Cases, Etc.)

For editorial information, see Section 18

Can-Pro Corp., Fond du Lac, Wis.
Duo-Pak Containers Co., Sausalito, Calif.
•Hinde & Dauch, Sandusky, Ohio
Hollinger Corp., Arlington, Va.
Jet-Pak, Inc., Newark, N. J.
•Jiffy Mfg. Co., Hillside, N. J.
Liberty Corrugated Container Corp., Brooklyn, N. Y.
•Melrose Packaging, New York
Prepac, Inc., New York
•Venesta Ltd., London, England

CONTAINERS, MOLDED PULP

For editorial information, see Section 6

American Lace Paper Co., Milwaukee
•Animal Trap Co. of America, Lititz, Pa.
Central Fibre Products Co., Quincy, Ill.
•Chaspec Mfg. Co., Greenwich, Conn.
Creative Moulded Products Co., New York
Diamond Match Co., New York
General Fibre Co., St. Louis, Mo.
Keiding Paper Products Co., Milwaukee
Keyes Fibre Sales Corp., New York
Pulp Reproduction Co., Milwaukee
Servon, Inc., New York

CONTAINERS, PAPER

(Liquid-Holding)

For editorial information, see Section 6

American Can Co., New York
American Lace Paper Co., Milwaukee
Bloomer Bros. Co., Newark, N. Y.
Champion Container Co., Philadelphia
Continental Can Co., Paper Container Div., Newark, N. J.
Dixie Cup Co., Easton, Pa.
•Fibreboard Products, Inc., San Francisco
Fonda Container Co., Inc., St. Albans, Vt.
Nebel Paper Products Co., Charlotte, N. C.
Robinson Waxed Paper Co., Fishponds, England
•Sutherland Paper Co., Kalamazoo, Mich.

CONTAINERS, PAPER

(Milk)

For editorial information, see Section 6

•Ace Carton Corp., Chicago
American Can Co., New York
•Fibreboard Products, Inc., San Francisco
International Paper Co., New York
Kieckhefer Container Co., Camden, N. J.
Sealright Co., Fulton, N. Y.

CONTAINERS, PAPER

(Nesting)

For editorial information, see Section 6

Bechtold, C. B., Co., Philadelphia
Bloomer Bros. Co., Newark, N. Y.
•Brooks & Porter, Inc., New York
Champion Container Co., Philadelphia
Comly-Gillam Carton Corp., Philadelphia
Continental Can Co., Paper Container Div., Newark, N. J.
Cupples-Hesse Corp., St. Louis, Mo.
Dixie Cup Co., Easton, Pa.
•Fibreboard Products, Inc., San Francisco
Lily-Tulip Cup Corp., New York
•Marathon Corp., Menasha, Wis.
Maryland Plastics, Inc., New York
Pie-Pak Co., Hoboken, N. J.
Schmidt, Henry, & Bros., Inc., Philadelphia
•Schoettle, Edwin J., Co., Philadelphia
Shadur Box Co., Milwaukee
Sonoco Products Co., Hartsville, S. C.
•Sutherland Paper Co., Kalamazoo, Mich.
•Sweetnam, George H., Inc., Cambridge, Mass.

CONTAINERS, PLASTIC

(See Boxes, Molded Plastic, Stock; for boxes, custom molded—see Molders, Plastic)

CONTAINERS, PLYWOOD

For editorial information, see Section 17

American Box Co., Sub. American Wood Products Corp., Cleveland
•Atlas-Boxmakers, Inc., Chicago
Atlas Plywood Corp., Boston
Bigelow-Garvey Lumber Co., Chicago
Martin Brothers Box Co., Toledo, Ohio
Nelson Co., Baltimore, Md.
Sauer Cooperage Co., Wyandotte, Mich.
Skill-Craft, Inc., Akron, Ohio
South Bend Box Co., Div. General Building Materials, Inc., South Bend, Ind.
Specification Packaging Engineering Corp., Burbank, Calif.
Tell City Furniture Co., Chicago
Townson, W. D., Lumber Co., Murphy, N. C.
Utility Crate Corp., Los Angeles
•Venesta Ltd., London, England

CONTAINERS, RIGID TRANSPARENT

(Fabricated from Sheet)

For editorial information, see Section 8

AAAAAA-Ace Paper Box Corp., New York
•American Cellubox Corp., Long Island City, N. Y.
American Kleer-Vu Plastics, Inc., Maspeth, N. Y.
Atlantic Paper Box Co., Boston
Bardes, A. G., Co., Milwaukee
Barnett, Samuel, Co., Philadelphia
Blank, Arthur, & Co., Boston
Borkland Mfg. Co., Marion, Ind.
Box Shop, Inc., New Haven, Conn.
•Burt, F. N., Co., Buffalo, N. Y.
Busch, V. W., Mfg. Co., South Lyon, Mich.
Cambridge Paper Box Co., Cambridge, Mass.
Casselman, T. & E., Inc., New York
Central States Paper & Bag Co., St. Louis, Mo.
Clinwill Plastics, Inc., Buffalo, N. Y.
Clover Plastic Contours, Inc., Norwalk, Conn.
Collier Mfg. Corp., Div. Warren Featherbone Co., Three Oaks, Mich.
•Container-Craft, Inc., New York
Continental Plastics Corp., Chicago
Crook, William A., Watertown, Mass.
Crystal-X Corp., Lenni Mills, Pa.
Dickinson, John, & Co., Hemel Hempstead, Herts., England
Earlville Paper Box Co., Earlville, N. Y.
Emerson Plastics Corp., New York
Essex Paper Box Mfg. Co., Newark, N. J.
•Extruded Plastics, Inc., Norwalk, Conn.
Fab-Weld Corp., Philadelphia
Falge Engineering Corp., Bethesda, Md.
Globe Paper Box Co., Chicago
Harkin Affiliates, Inc., New York
Harmon, Ira, Co., New York
Hedwin Corp., Baltimore, Md.
Henry, Ira L., Watertown, Wis.
Imperial Paper Box Corp., Brooklyn, N. Y.
•J. E. Plastic Mfg. Corp., New York
Jones, Jesse, Box Corp., Philadelphia
Just Plastics, Inc., New York
Kalamazoo Paper Box Co., Kalamazoo, Mich.
Kroeck Paper Box Co., Chicago
•Lebanon Paper Box Co., Lebanon, Pa.
•Lermer Plastics, Inc., Garwood, N. J.
Lucid Containers, New York
Mankato Paper Box Co., Mankato, Minn.
Maryland Plastics, Inc., New York
Merit Displays Co., Paterson, N. J.
•Miro Container Corp., Brooklyn, N. Y.
National Vacuum Molding Corp., Yonkers, N. Y.
Newark Paper Box Co., Newark, N. J.
Northwestern Paper Box Co., Seattle, Wash.
•Old Dominion Box Co., Charlotte, N. C.
Pacific Paper Box Co., Los Angeles
Paper Package Co., Indianapolis
Pioneer Valley Plastics Co., Chicopee, Mass.
•Plastic Artisans, Inc., White Plains, N. Y.
Plastic Box Co., San Francisco
Plastofilm, Inc., Wheaton, Ill.
Plaxall, Inc., Long Island City, N. Y.
Ritchie, W. C., & Co., Chicago
Robinson, A. E., Co., Chicago
Rome Plastic Specialties, Inc., Worcester, Mass.
Schmitz, Henry A., Inc., Ballston Spa, N. Y.
Shaw Paper Box Co., Pawtucket, R. I.
•Shaw-Randall Co., Pawtucket, R. I.
Shoe Form Co., Auburn, N. Y.
Sillcocks-Miller Co., Maplewood, N. J.
Snyder, George H., Inc., Philadelphia
Sparks Corp., Philadelphia
Transparent Fabricators, Inc., New York
Transparent Plastics Container Co., New York
Union Specialty Co., Bloomingdale, N. J.
Universal Jewelry Case Co., Chicopee, Mass.
Vacuum Molding, Inc., Boonton, N. J.
Valentine Process Corp., Rochelle Park, N. J.
Ve-Alite Plastic Corp., Brooklyn, N. Y.
•Vlchek Tool Co., Cleveland
Warneke Paper Box Co., Denver, Colo.
•Warner Bros. Co., Bridgeport, Conn.
Weaver Packaging Co., Montrose, Calif.
Weinman Bros., Inc., Chicago
Western Coil & Electrical Co., Racine, Wis.
Whitehead & Hoag Co., Newark, N. J.
Williams Bros. Paper Box Co., St. Joseph, Mich.
Wrapture, Inc., Flushing, N. Y.
Zumbiel, C. W., Co., Cincinnati

CONTAINERS, SHIPPING, WEATHERPROOF CORRUGATED (V-Boxes)

For editorial information, see Section 17

American Box Board Co., Grand Rapids, Mich.
American Box Co., Sub. American Wood Products Corp., Cleveland
American Carton Wrapper Co., Chicago
Bowaters Sales Co., London, England
Brown Container Co., West Monroe, La.
Central Fibre Products Co., Quincy, Ill.
Chippewa Paper Products Co., Chicago
Container Corp. of America, Chicago
Cornell Paperboard Products Co., Milwaukee
Corro, Ltd., New York
Crescent Box Corp., Philadelphia
Crook Paper Box Co., No. Kansas City, Mo.
Dubuque Container Co., Dubuque, Iowa
Fab-Weld Corp., Philadelphia
Federal Container Corp., Minneapolis
•Fibreboard Products, Inc., San Francisco
Fitzhugh, William W., Inc., New York
Forsberg Paper Box Co., Madison, Wis.
Fort Wayne Corrugated Paper Co., Fort Wayne, Ind.
•Gair, Robert, Co., New York
•Gaylord Container Corp., St. Louis, Mo.
•Gibraltar Corrugated Paper Co., Display Div., Clifton, N. J.
Grand City Container Corp., No. Bergen, N. J.
Green Bay Box Co., Green Bay, Wis.
•Growers Container Corp., Salinas, Calif.
•Hinde & Dauch, Sandusky, Ohio
Hollinger Corp., Arlington, Va.
Industrial Container Corp., Brooklyn, N. Y.
•Inland Container Corp., Indianapolis
Kieckhefer Container Co., Camden, N. J.
Krafco Container Corp., Dallas, Texas
Kress, F. J., Box Co., Pittsburgh
Lawless Bros. Container Corp., No. Tonawanda, N. J.
Liberty Corrugated Container Corp., Brooklyn, N. Y.
Mengel Co., Louisville, Ky.
Merit Container Corp., New York
Mohawk Containers, Inc., New Hartford, N. Y.
•National Container Corp., New York
Ottawa River Paper Co., Toledo, Ohio
Rochester Folding Box Co., Rochester, N. Y.
St. Joe Paper Co., Houston Container Div., Houston, Texas
St. Regis Paper Co., New York
Stone Container Corp., Chicago
Union Bag & Paper Corp., New York
Wabash Fibre Box Co., Terre Haute, Ind.
Waldorf Paper Products Co., St. Paul, Minn.
Wisconsin Container Corp., Menasha, Wis.

CONTAINERS, SHIPPING WEATHERPROOF SOLID FIBRE (V-Boxes)

For editorial information, see Section 17

•Atlas-Boxmakers, Inc., Chicago
American Box Board Co., Grand Rapids, Mich.
Central Fibre Products Co., Quincy, Ill.
Chippewa Paper Products Co., Chicago
Container Corp. of America, Chicago
Cornell Paperboard Products Co., Milwaukee
Corro, Ltd., New York
Crook Paper Box Co., No. Kansas City, Mo.
Danbury Square Box Co., Danbury, Conn.
Dunning, J. H., Corp., Darien, Conn.
Federal Container Corp., Minneapolis
•Fibreboard Products, Inc., San Francisco
•Gair, Robert, Co., New York
•Gaylord Container Corp., St. Louis, Mo.
Grand City Container Corp., No. Bergen, N. J.
Hollinger Corp., Arlington, Va.
Industrial Container Corp., Brooklyn, N. Y.
Kieckhefer Container Co., Camden, N. J.
Merit Container Corp., New York
•National Container Corp., New York
River Raisin Paper Co., Monroe, Mich.
Rochester Folding Box Co., Rochester, N. Y.
Waldorf Paper Products Co., St. Paul, Minn.
Wisconsin Container Corp., Menasha, Wis.

CONTAINERS VENEER

For editorial information, see Section 17

American Box Co., Sub. American Wood Products Corp., Cleveland
Apex Paper Box Corp., Chicago
Atlas Plywood Corp., Boston
Main Bros. Box & Lumber Co., Karnak, Ill.
Martin Brothers Box Co., Toledo, Ohio

CRATES, WOOD, PLYWOOD, & COMPOSITE

For editorial information, see Section 17

American Box Co., Sub. American Wood Products Corp., Cleveland
Atlas Plywood Corp., Boston
Bigelow-Garvey Lumber Co., Chicago
Bogert & Hopper, Inc., New York
Chaffee Brothers Co., Oxford, Mass.
Cozier Container Corp., Cleveland
Dunning, J. H., Corp., Darien, Conn.
General Box Co., Des Plaines, Ill.
Gould, Jerome F., Corp., Brooklyn, N. Y.
Lange & Crist Lumber Co., Clarksburg, W. Va.
Lea, David M., & Co., Richmond, Va.
Main Bros. Box & Lumber Co., Karnak, Ill.
Martin Brothers Box Co., Toledo, Ohio
Nelson Co., Baltimore, Md.
Seattle Box Co., Seattle, Wash.
Skill-Craft, Inc., Akron, Ohio
South Bend Box Co., Div. General Building Materials, Inc., South Bend, Ind.
Southern Lumber & Mfg. Co., Ellijay, Ga.
Specification Packaging Engineering Corp., Burbank, Calif.
Sterling Lumber & Supply Co., Chicago
Utility Crate Corp., Los Angeles
Venesta Ltd., London, England
Williamsburg Millwork Corp., Williamsburg, Va.

CUPS, PAPER

(Liquid-Holding)

For editorial information, see Section 6

American Lace Paper Co., Milwaukee
Cupples-Hesse Corp., St. Louis, Mo.
Champion Container Co., Philadelphia
Dixie Cup Co., Easton, Pa.
Globe Envelopes, Ltd., Toronto, Ont.
Keyes Fibre Sales Corp., New York
Lily-Tulip Cup Corp., New York
•Marathon Corp., Menasha, Wis.
Solo Cup Co., Chicago
•Sutherland Paper Co., Kalamazoo, Mich.

CUPS, PAPER OR FOIL

(For Candy & Baking)

For editorial information, see Section 3

Oldmill Paper Products Corp., Long Island City, N. Y.
Twombly, C. E., Co., Medford, Mass.

DISPLAYS, CABINET

For editorial information, see Section 14

Advertising Metal Display Co., Chicago
Alsten Co., New York
Berkowitz, Leon L., Co., Philadelphia
Burnett, R. L., Co., San Antonio, Texas
Chaffee Brothers Co., Oxford, Mass.
•Chaspec Mfg. Co., Greenwich, Conn.
Claremould Plastics Co., Newark, N. J.
Copeland Displays, Inc., New York
Corro-Lith Corp., Long Island City, N. Y.
Davidson-Hansen, Inc., New York
Einson-Freeman Co., Long Island City, N. Y.
Essex Paper Box Mfg. Co., Newark, N. J.
Goldman, Neal, Assoc., New York
Just Plastics, Inc., New York
Kay, Inc., New York
Lawson & Lawson, Inc., New York
Leominster Paper Box Co., Leominster, Mass.
Master-Kraft Fixture Co., Baltimore, Md.
Merit Displays Co., Paterson, N. J.
Moskowitz, Jack, Displays, New York
Oberly & Newell Lithograph Corp., New York
Plaxall, Inc., Long Island City, N. Y.
Process Displays, Inc., Milwaukee
Rhoades Paper Box Co., Springfield, Ohio
Rock Mfg. Co., Stoughton, Mass.
Srofe, Jesse, Cincinnati
Stensgaard, W. L., & Assoc., Inc., Chicago
Tell City Furniture Co., Chicago
Vacuum Molding, Inc., Boonton, N. J.
Wrapture, Inc., Flushing, N. Y.

DISPLAYS, COUNTER

(Merchandise & Dispensing)

For editorial information, see Section 14

Abana Products, Inc., Chicago
•Ace Carton Corp., Chicago
Acme Paper Box Co., San Francisco
Ad Vac Plastics Corp., Indianapolis
Advertising Metal Display Co., Chicago
Alsten Co., New York
Alton Boxmakers, Inc., St. Louis, Mo.
American Carton Wrapper Co., Chicago
•American Cellubox Corp., Long Island City, N. Y.
American Die & Box Co., Denver, Colo.
Andre Paper Box Co., San Francisco
Austin, O., Brooklyn, N. Y.
Berkowitz, Leon L., Philadelphia
•Berles Carton Co., Paterson, N. J.
•Brooks & Porter, Inc., New York
Bruce Carton Co., Memphis, Tenn.
Burton Packaging Co., New York
Butler & Ferrigno Lithographic Co., Philadelphia
Cambridge Paper Box Co., Cambridge, Mass.
Casco Paper Box Co., Portland, Maine
Central Wire Frame Co., New York
Chaffee Brothers Co., Oxford, Mass.
Chanal Plastics Corp., Brooklyn, N. Y.
•Chaspec Mfg. Co., Greenwich, Conn.
Claremould Plastics Co., Newark, N. J.
Clinwill Plastics, Inc., Buffalo, N. Y.
Collett Sproule Boxes, Ltd., Toronto, Ont.
Collier Mfg. Corp., Div. Warren Featherbone Co., Three Oaks, Mich.
Comly-Gillam Carton Corp., Philadelphia
Consolidated Lithograph Div., Somerville Ltd., Montreal, Que.
Container Corp. of America, Chicago
Copeland Displays, Inc., New York
Corro-Lith Corp., Long Island City, N. Y.
Courtland Box Co., Columbus, Ohio
Crescent Box Corp., Philadelphia
Crook Paper Box Co., No. Kansas City, Mo.
Crook, William A., Co., Watertown, Mass.
Curtis, S., & Son, Inc., Sandy Hook, Conn.
Davidson-Hansen, Inc., New York
Davis, S. H., Paper Box Co., Toledo, Ohio
Devon Products, Inc., New York
Display Finishing Co., Long Island City, N. Y.
Dubuque Container Co., Dubuque, Iowa
Dunning, J. H., Corp., Darien, Conn.
Eclipse Plastic Industries, Inc., Sarasota, Fla.
Einson-Freeman Co., Long Island City, N. Y.
Emerson Plastics Corp., New York
Essex Paper Box Mfg. Co., Newark, N. J.
Feder Industries, Inc., New York
Federal Carton Corp., No. Bergen, N. J.
Fitzhugh, William W., Inc., New York
Forsberg Paper Box Co., Madison, Wis.
•Frank, Walter, Elmhurst, Ill.
Fuller Displays, Inc., Long Island City, N. Y.
•Gair, Robert, Co., New York
Gale Dorothea Mechanisms, Inc., Woodside, N. Y.
General Carton Co., Cleveland
•Gibraltar Corrugated Paper Co., Display Div., Clifton, N. J.
Goldman, Neal, Assoc., New York
Goodman, L. A., Mfg. Co., Chicago
Grand City Container Corp., No. Bergen, N. J.
Gray Wire Specialty Co., Cleveland
Green Bay Box Co., Green Bay, Wis.
•Hinde & Dauch, Sandusky, Ohio
•Howell, F. M., & Co., Elmira, N. Y.
Independent Lithograph Co., San Francisco
Just Plastics, Inc., New York
Kaumagraph Co., Wilmington, Del.
Kay, Inc., New York
Ketterlinus Litho. Mfg. Co., Primos, Pa.
Kieckhefer Container Co., Camden, N. J.
Kiernan-Hughes Co., Jersey City, N. J.
Kindred, MacLean & Co., Long Island City, N. Y.
Koehler, Karl, Assoc., Cooperburg, Pa.
Landowne, J., Co., Brooklyn, N. Y.
Landsberger Co., New York
Lawson & Jones, Ltd., London, Ont.
Lawson & Lawson, Inc., New York
Lengsfield Brothers, Inc., New Orleans, La.
Leominster Paper Box Co., Leominster, Mass.
Levy, J., New York
Magill-Weinsheimer Co., Lincolnwood, Ill.
Mankato Paper Box Co., Mankato, Minn.
Masta Displays, Inc., New York
Master-Kraft Fixture Co., Baltimore, Md.
McDonald Printing Co., Cincinnati
Meehan Tooker Co., New York
Mengel Co., Louisville, Ky.
Merchandise Press, Inc., New York
Merit Displays Co., Paterson, N. J.
Metal Box Co., London, England
•Milprint, Inc., Milwaukee
Moskowitz, Jack, Displays, New York
•National Folding Box Co., Sub. Federal Board Co., New York
National Vacuum Molding Corp., Yonkers, N. Y.
Nebel Paper Products Co., Charlotte, N. C.
Newark Paper Box Co., Newark, N. J.
Niagara Box Factory, Inc., New York
Novel Enterprises, Brooklyn, N. Y.

Oberly & Newell Lithograph Corp., New York
Ottawa River Paper Co., Toledo, Ohio
Pacific Coast Foil Co., Div. of Jorgenson & Co., San Francisco
Pilliod Cabinet Co., Swanton, Ohio
•Plastic Artisans, Inc., White Plains, N. Y.
Plaxall, Inc., Long Island City, N. Y.
Pohlig Brothers, Inc., Richmond, Va.
Process Displays, Inc., Milwaukee
Rhoades Paper Box Co., Springfield, Ohio
•Richardson Taylor-Globe Corp., Cincinnati
Ritchie, W. C., & Co., Chicago
Robinson, E. S. & A., (Canada) Ltd., Toronto, Ont.
Rock Mfg. Co., Stoughton, Mass.
•Rondo American Corp., Hamden, Conn.
San Diego Paper Box Co., San Diego, Calif.
Schmidt Lithograph Co., San Francisco
Schmitt, Charles J., Co., San Francisco
Sculptural Promotions, Inc., New York
Shadur Box Co., Milwaukee
Srofe, Jesse, Cincinnati
Stensgaard, W. L., & Assoc., Inc., Chicago
Stone Container Corp., Chicago
Stylepak Box Corp., Los Angeles
Superior Folding Box Co., St. Louis, Mo.
Tell City Furniture Co., Chicago
Thorpe, F. M., Mfg. Co., Lamar, Mo.
•U. S. Printing & Lithograph Co., Cincinnati
Universal Folding Box Co., Hoboken, N. J.
Vacuum Molding, Inc., Boonton, N. J.
Van Vick Paper Box Co., Duluth, Minn.
Ve-Alite Plastic Corp., Brooklyn, N. Y.
Wabash Fibre Box Co., Terre Haute, Ind.
Waldorf Paper Products Co., St. Paul, Minn.
Warneke Paper Box Co., Denver, Colo.
Wedgewood Press, Inc., New York
Wesco Assoc., New York
Western Lithograph Co., Los Angeles
Whitehead & Hoag Co., Newark, N. J.
Williams, Bill, & Co., New York
Wolf Die Cutting Co., Brooklyn, N. Y.
Wrapture, Inc., Flushing, N. Y.
Zumbiel, C. W., Co., Cincinnati

DISPLAYS, FLOOR STAND

For editorial information, see Section 14

•Ace Carton Corp., Chicago
Acme Paper Box Co., San Francisco
Advertising Metal Display Co., Chicago
American Box Board Co., Grand Rapids, Mich.
American Carton Wrapper Co., Chicago
Austin, O., Brooklyn, N. Y.
Berkowitz, Leon L., Philadelphia
Burton Packaging Co., New York
Central Wire Frame Co., New York
Chaffee Brothers Co., Oxford, Mass.
•Chaspec Mfg. Co., Greenwich, Conn.
Chippewa Paper Products Co., Chicago
Claremould Plastics Co., Newark, N. J.
Consolidated Lithograph Div., Somerville Ltd., Montreal, Que.
Container Corp. of America, Chicago
Copeland Displays, Inc., New York
Corro-Lith Corp., Long Island City, N. Y.
Crescent Box Corp., Philadelphia
Davidson-Hansen, Inc., New York
Display Finishing Co., Long Island City, N. Y.
Einson-Freeman Co., Long Island City, N. Y.
Fab-Weld Corp., Philadelphia
Federal Carton Corp., No. Bergen, N. J.
Federal Container Corp., Minneapolis
Fitzhugh, William W., Inc., New York
•Foilcraft Printing Corp., Brooklyn, N. Y.
Forbes Lithograph Mfg. Co., Boston
Fuller Displays, Inc., Long Island City, N. Y.
•Gair, Robert, Co., New York
•Gaylord Container Corp., St. Louis, Mo.
•Gibraltar Corrugated Paper Co., Display Div., Clifton, N. J.
Goodman, L. A., Mfg. Co., Chicago
Grand City Container Corp., No. Bergen, N. J.
Gray Wire Specialty Co., Cleveland
Hankins Container Co., Cleveland
•Hinde & Dauch, Sandusky, Ohio
Independent Lithograph Co., San Francisco
Kay, Inc., New York
Ketterlinus Litho. Mfg. Co., Primos, Pa.
Kieckhefer Container Co., Camden, N. J.
Kindred, MacLean & Co., Long Island City, N. Y.
Lawson & Jones, Ltd., London, Ont.
Lawson & Lawson, Inc., New York
Magill-Weinsheimer Co., Lincolnwood, Ill.
Master-Kraft Fixture Co., Baltimore, Md.
McDonald Printing Co., Cincinnati
Mealey, R. J., Corp., San Francisco
Mengel Co., Louisville, Ky.
Merit Displays Co., Paterson, N. J.
Moskowitz, Jack, Displays, New York
Oberly & Newell Lithograph Corp., New York
Ottawa River Paper Co., Toledo, Ohio
Pacific Coast Foil Co., Div. of Jorgenson & Co., San Francisco
Process Displays, Inc., Milwaukee
Robinson, E. S. & A., (Canada) Ltd., Toronto, Ont.
Schmidt Lithograph Co., San Francisco
Srofe, Jesse, Cincinnati
Stensgaard, W. L., & Assoc., Inc., Chicago
Stone Container Corp., Chicago
Tell City Furniture Co., Chicago
Thorpe, F. M., Mfg. Co., Lamar, Mo.
•U. S. Printing & Lithograph Co., Cincinnati
Ve-Alite Plastic Corp., Brooklyn, N. Y.
Wabash Fibre Box Co., Terre Haute, Ind.
Waldorf Paper Products Co., St. Paul, Minn.
Wesco Assoc., Inc., New York
Western Lithograph Co., Los Angeles
Whitehead & Hoag Co., Newark, N. J.
Wolf Die Cutting Co., Brooklyn, N. Y.

DISPLAYS, LITHOGRAPHED

For editorial information, see Section 14

•Ace Carton Corp., Chicago
Acme Paper Box Co., San Francisco
Advertising Metal Display Co., Chicago
American Carton Wrapper Co., Chicago
Berkowitz, Leon L., Co., Philadelphia
Brandau Craig Dickerson Co., Nashville, Tenn.
Brett Lithographing Co., Long Island City, N. Y.
Butler & Ferrigno Lithographic Co., Philadelphia
•Chaspec Mfg. Co., Greenwich, Conn.
Clay Printing Co., Hickory, N. C.
Consolidated Lithograph Div. Somerville Ltd., Montreal, Que.
Corro-Lith Corp., Long Island City, N. Y.
•Crocker, H. S., Co., San Bruno, Calif.
Davidson-Hansen, Inc., New York
Display Finishing Co., Long Island City, N. Y.
Donald Art Co., Mamaroneck, N. Y.
Einson-Freeman Co., Long Island City, N. Y.
Epsen Lithographing Co., Omaha, Neb.
•Ever Ready Label Corp., Belleville, N. J.
Fitzhugh, William W., Inc., New York
Fleishhacker Paper Box Co., San Leandro, Calif.
Forbes Lithograph Mfg. Co., Boston
Fuller Displays, Inc., Long Island City, N. Y.
Goldman, Neal, Assoc., New York
Goodman, L. A., Mfg. Co., Chicago
Herald Press, Inc., Charlotte, N. C.
Independent Lithograph Co., San Francisco
Inland Lithograph Co., Chicago
Ketterlinus Litho. Mfg. Co., Primos, Pa.
Kaumagraph Co., Wilmington, Del.
Kindred, MacLean & Co., Long Island City, N. Y.
Koehler, Karl, Assoc., Coopersburg, Pa.
Lawson & Jones, Ltd., London, Ont.
Lawson & Lawson, Inc., New York
Magill-Weinsheimer Co., Lincolnwood, Ill.
McCandlish Lithograph Corp., Philadelphia
Meehan Tooker Co., New York
Merit Displays Co., Paterson, N. J.
Metal Box Co., Ltd., London, England
•Milprint, Inc., Milwaukee
Moskowitz, Jack, Displays, New York
Nebel Paper Products Co., Charlotte, N. C.
Oberly & Newell Lithograph Corp., New York
Pacific Coast Foil Co., Div. of Jorgenson & Co., San Francisco
Penn Lithographing Co., Philadelphia
Process Displays, Inc., Milwaukee
Progress Lithographing Co., Cincinnati
Robinson, E. S. & A., (Canada) Ltd., Toronto, Ont.
Schmidt Lithograph Co., San Francisco
Srofe, Jesse, Cincinnati
Stensgaard, W. L., & Assoc., Inc., Chicago
•U. S. Printing & Lithograph Co., Cincinnati
Valentine Process Corp., Rochelle Park, N. J.
Waldorf Paper Products Co., St. Paul, Minn.
Wedgewood Press, Inc., New York
Weil's, David, Sons Lithographic Co., Brooklyn, N. Y.
Wesco Assoc., Inc., New York
Western Lithograph Co., Los Angeles
Wolf Die Cutting Co., Brooklyn, N. Y.
Wrapture, Inc., Flushing, N. Y.

DISPLAYS, METAL, SHEET

For editorial information, see Section 14

Advertising Metal Display Co., Chicago
Austin, O., Brooklyn, N. Y.
Berkowitz, Leon L., Philadelphia
•Chaspec Mfg. Co., Greenwich, Conn.
Copeland Displays, Inc., New York
Davidson-Hansen, Inc., New York
Einson-Freeman Co., Long Island City, N. Y.
Fab-Weld Corp., Philadelphia
Fuller Displays, Inc., Long Island City, N. Y.
Goldman, Neal, Assoc., New York
Kay, Inc., New York
Lawson & Lawson, Inc., New York
Metaline Products Co., So. Amboy, N. J.
Metal Box Co., Ltd., London, England
Moskowitz, Jack, Displays, New York
Srofe, Jesse, Cincinnati
Stensgaard, W. L., & Assoc., Inc., Chicago
Thorpe, F. M., Mfg. Co., Lamar, Mo.

DISPLAYS, MOLDED PLASTIC

For editorial information, see Section 14

Ad Vac Plastics Corp., Indianapolis
Beaman Plastics, Portland, Ore.
Bolta Products, Div. General Tire & Rubber Co., Lawrence, Mass.
Boonton Molding Co., Boonton, N. J.
Borkland Mfg. Co., Marion, Ind.
•Bradley Associates, Inc., Chicago
Braun-Crystal Mfg. Co., Middle Village, N. Y.
Chanal Plastics Corp., Brooklyn, N. Y.
•Chaspec Mfg. Co., Greenwich, Conn.
Claremould Plastics Co., Newark, N. J.
Collier Mfg. Corp., Div. Warren Featherbone Co., Three Oaks, Mich.
Connecticut Plastic Products Co., Waterbury, Conn.
Creative Moulded Products Co., New York

Crystal-X Corp., Lenni Mills, Pa.
Davidson-Hansen, Inc., New York
Eclipse Plastic Industries, Inc., Sarasota, Fla.
Einson-Freeman Co., Long Island City, N. Y.
Emeloid Co., Hillside, N. J.
Emerson Plastics Corp., New York
Frank Paper Products Corp., Detroit
•Frank, Walter, Elmhurst, Ill.
Fuller Displays, Inc., Long Island City, N. Y.
Goldman, Neal, Assoc., New York
Goodman, L. A., Mfg. Co., Chicago
Kay, Inc., New York
Kesco Mfg. Co., Chicago
Koller Craft Plastic Products, Fenton, Mo.
Lawson & Lawson, Inc., New York
Lurie Plastics, Inc., Colonial Heights, Va.
Magill-Weinsheimer Co., Lincolnwood, Ill.
Mankato Paper Box Co., Mankato, Minn.
Maryland Plastics, Inc., New York
Merit Displays Co., Paterson, N. J.
Molded Products Div., Admiral Corp., West Chicago, Ill.
Moonglow Novelty Corp., New York
Moskowitz, Jack, Displays, New York
National Vacuum Molding Corp., Yonkers, N. Y.
Nosco Plastics, Inc., Erie, Pa.
Opticase Co., Newark, N. J.
Paper Package Co., Indianapolis
Pioneer Folding Box Co., Chicopee, Mass.
Plastofilm, Inc., Wheaton, Ill.
Process Displays, Inc., Milwaukee
Schmitz, Henry A., Inc., Ballston Spa, N. Y.
Sculptural Promotions, Inc., New York
Shoe Form Co., Auburn, N. Y.
Sillcocks-Miller Co., Maplewood, N. J.
Sparks Corp., Philadelphia
Srofe, Jesse, Cincinnati
Steiner Plastics Mfg. Co., Glen Cove, N. Y.
Stensgaard, W. L., & Assoc., Chicago
Twinkle Display & Mfg. Co., Dallas, Texas
Vacuum Molding, Inc., Boonton, N. J.
Valentine Process Corp., Rochelle Park, N. J.
Ve-Alite Plastic Corp., Brooklyn, N. Y.
•Vlchek Tool Co., Cleveland
Wesco Assoc., Inc., New York
Western Lithograph Co., Los Angeles
Whitehead & Hoag Co., Newark, N. J.
Wildon Industries, Inc., New York
Wilpet Tool & Mfg. Co., Kearny, N. J.
Wrapture, Inc., Flushing, N. Y.

DISPLAYS, MOTION

For editorial information, see Section 14

Alsten Co., New York
Berkowitz, Leon L., Philadelphia
•Chaspec Mfg. Co., Greenwich, Conn.
Copeland Displays, Inc., New York
Corro-Lith Corp., Long Island City, N. Y.
Davidson-Hansen, Inc., New York
Display Finishing Co., Long Island City, N. Y.
Einson-Freeman Co., Long Island City, N. Y.
Forbes Lithograph Mfg. Co., Boston
Forsberg Paper Box Co., Madison, Wis.
Fuller Displays, Inc., Long Island City, N. Y.
Gale Dorothea Mechanisms, Inc., Woodside, N. Y.
Goldman, Neal, Assoc., New York
Goodman, L. A., Mfg. Co., Chicago
Green Bay Box Co., Green Bay, Wis.
Kay, Inc., New York
Ketterlinus Litho. Mfg. Co., Primos, Pa.
Kindred, MacLean & Co., Long Island City, N. Y.
Koehler, Karl, Assoc., Coopersburg, Pa.
Lansky Die Cutting Corp., New York
Lawson & Jones Ltd., London, Ont.
Lawson & Lawson, Inc., New York
Magill-Weinsheimer Co., Lincolnwood, Ill.
Masta Displays, Inc., New York
Merit Displays Co., Paterson, N. J.
Moskowitz, Jack, Displays, New York
Oberly & Newell Lithograph Corp., New York
Process Displays, Inc., Milwaukee
Schmidt Lithograph Co., San Francisco
Srofe, Jesse, Cincinnati
Stensgaard, W. L., & Assoc., Inc., Chicago
Twinkle Display & Mfg. Co., Dallas, Texas
•U. S. Printing & Lithograph Co., Cincinnati
Waldorf Paper Products Co., St. Paul, Minn.
Wedgewood Press, Inc., New York
Wesco Assoc., Inc., New York
Western Lithograph Co., Los Angeles
Wolf Die Cutting Co., Brooklyn, N. Y.

DISPLAYS, WIRE

For editorial information, see Section 14

Alsten Co., New York
Austin, O., Brooklyn, N. Y.
Central Wire Frame Co., New York
•Chaspec Mfg. Co., Greenwich, Conn.
Copeland Displays, Inc., New York
Davidson-Hansen, Inc., New York
Einson-Freeman Co., Long Island City, N. Y.
Fab-Weld Corp., Philadelphia
Goldman, Neal, Assoc., New York
Gray Wire Specialty Co., Cleveland
Kay, Inc., New York
Lawson & Lawson, Inc., New York
Metaline Products Co., So. Amboy, N. J.
Moskowitz, Jack, Displays, New York
Sculptural Promotions, Inc., New York
Stensgaard, W. L., & Assoc., Inc., Chicago
Thorpe, F. M., Mfg. Co., Lamar, Mo.
Williams, Gabriel, Co., Brooklyn, N. Y.
Wolf Die Cutting Co., Brooklyn, N. Y.

DRUMS, FIBRE

For editorial information, see Section 17

Bowaters Sales Co., London, England
Climax Fibre Drum Co., Carthage, N. Y.
Continental Can Co., Fibre Drum Div., Van Wert, Ohio
Emery-Carpenter Container Co., Cincinnati
Fibre Drum Co., Chicago
•Fibreboard Products, Inc., San Francisco
Grief Bros. Cooperage Corp., Delaware, Ohio
Illinois Cooperage Mfg. Co., Chicago
Industrial Steel & Fibre, Ltd., Terrebonne, Que.
Master Package Corp., Owen, Wis.
Monmouth Container Corp., Matawan, N. J.
Northern Cooperage Div., Greif Bros. Cooperage Corp., St. Paul, Minn.
Plyfiber Container Corp., Garwood, N. J.
Raible, J. R., Co., Birmingham, Ala.
Rheem Mfg. Co., Richmond, Calif.
Sandusky Cooperage & Lumber Co., Div. Grief Bros. Cooperage, St. Louis, Mo.
Sauer Cooperage Co., Wyandotte, Mich.
Seymour & Peck Co., Blue Island, Ill.
Sonoco Products Co., Hartsville, S. C.
•Venesta Ltd., London, England
Virginia Barrel Co., Div. Grief Bros. Cooperage Corp., Staten Island, N. Y.

DRUMS, PLYWOOD

For editorial information, see Section 17

Atlas Plywood Corp., Boston
Grief Bros. Cooperage Corp., Delaware, Ohio
Raible, J. R., Co., Birmingham, Ala.
Sandusky Cooperage & Lumber Co., Div. Grief Bros. Cooperage, St. Louis, Mo.
Sauer Cooperage Co., Wyandotte, Mich.
•Venesta Ltd., London, England

DRUMS & BARRELS, METAL

For editorial information, see Section 17

Bennett Industries, Inc., Peotone, Ill.
Calig Steel Drum Co., Pittsburgh
Columbia Can Co., Maspeth, N. Y.
•Crown Cork & Seal Co., Can Div., Philadelphia
Fab-Weld Corp., Philadelphia
Firestone Tire & Rubber Co., Steel Products Div., Akron, Ohio
Geuder, Paeschke & Frey Co., Milwaukee
Grief Bros. Cooperage Corp., Delaware, Ohio
Heintz Mfg. Co., Philadelphia
Industrial Steel Container Co., St. Paul, Minn.
Inland Steel Container Co., Div. Inland Steel Co., Chicago
Jones & Laughlin Steel Corp., Pittsburgh
Nesco, Div. New York Shipbuilding Corp., Granite, Ill.
Niedringhaus Metal Products Co., St. Louis, Mo.
Northern Cooperage Div., Greif Bros. Cooperage Corp., St. Paul, Minn.
Raible, J. R., Co., Birmingham, Ala.
Republic Steel Corp., Container Div., Niles, Ohio
Rheem Mfg. Co., Richmond, Calif.
Sandusky Cooperage & Lumber Co., Div. Grief Bros. Cooperage, St. Louis, Mo.
Sauer Cooperage Co., Wyandotte, Mich.
Southline Metal Products Co., Houston, Texas
Thompson Can Co., Dallas, Texas
United Steel Barrel Co., Philadelphia
Van Leer's Vatenfabrieken N. V., Amsterdam, Holland
Vulcan Containers, Inc., Bellwood, Ill.
Vulcan Containers, Ltd., Toronto, Ont.
Vulcan Steel Container Co., Birmingham, Ala.
Wheeling Steel Corp., Wheeling, W. Va.

ENVELOPES

(See also Bags)

ENVELOPES, CLASP

For editorial information, see Section 7

Ames Safety Envelope Co., Somerville, Mass.
•Andrews, P. L., Corp., New York
Boston Envelope Co., Dedham, Mass.
Cohoes Carrybag Co., Cohoes, N. Y.
Cupples, Samuel, Envelope Co., Brooklyn, N. Y.
Cupples-Hesse Corp., St. Louis, Mo.
•Equitable Paper Bag Co., Long Island City, N. Y.
Globe Envelopes, Ltd., Toronto, Ont.
Globe Envelope Mfg. Co., Los Angeles
Herald Press, Inc., Charlotte, N. C.
Mason Envelope Co., New York
Nebel Paper Products Co., Charlotte, N. C.
Neostyle, Inc., Birmingham, Mich.
Royal Paper Corp., New York
Tension Envelope Corp., Kansas City, Mo.
•United States Envelope Co., Springfield, Mass.
Wedgewood Press, Inc., New York
Wolf Detroit Envelope Co., Detroit

ENVELOPES, CLOTH & COTTON-LINED PAPER

For editorial information, see Section 7

Ames Bag Co., Selma, Ala.
Ames Safety Envelope Co., Somerville, Mass.
Canada Paper "Wholesale" Ltd., Toronto, Ont.
Celwa Products Co., New York
•Cottonluxe Mfg. Co., New York

Cupples-Hesse Corp., St. Louis, Mo.
Dickinson, John, & Co., Hemel Hempstead, Herts., England
•Empire Specialty Envelope Co., Brooklyn N. Y.
Homer-Alden Co., No. Attleboro, Mass.
Mason Envelope Co., New York
Siris, A. J., Products Corp., New York

ENVELOPES, PACKAGING

(Opaque)

For editorial information, see Section 7

•Andrews, P. L., Corp., New York
Boston Envelope Co., Dedham, Mass.
Brown Bag Filling Machine Co., Fitchburg, Mass.
Clearprint, Inc., New York
Collier Mfg. Corp., Div. Warren Featherbone Co., Three Oaks, Mich.
Cupples, Samuel, Envelope Co., Brooklyn, N. Y.
Cupples-Hesse Corp., St. Louis, Mo.
Dickinson, John, & Co., Hemel Hempstead, Herts., England
Dura-Lee Corp., Kansas City, Mo.
Electronic Wave Products, Inc., New York
•Equitable Paper Bag Co., Long Island City, N. Y.
Fitzhugh, William W., Inc., New York
Globe Envelope Mfg. Co., Los Angeles
Globe Envelopes Ltd., Toronto, Ont.
Herald Press, Inc., Charlotte, N. C.
Herz, Alexander, Co., New York
Jet-Pak, Inc., Newark, N. J.
Kehr Products Co., Philadelphia
Mason Envelope Co., New York
•Milprint, Inc., Milwaukee
Nebel Paper Products Co., Charlotte, N. C.
Neostyle, Inc., Birmingham, Mich.
Perry Envelope & Bag Co., New York
Phoenix Products Co., Milwaukee
Prepac, Inc., New York
Print-A-Tube Co., Rochelle Park, N. J.
Robinson, E. S. & A., (Canada) Ltd., Toronto, Ont.
Royal Paper Corp., New York
Siris, A. J., Products Corp., New York
Spec-Fab Co., Philadelphia
Stecher-Traung Lithograph Corp., Rochester, N. Y.
Tension Envelope Corp., Kansas City, Mo.
•United States Envelope Co., Springfield, Mass.
Vanant Products, Tomah, Wis.
Wolf Detroit Envelope Co., Detroit

ENVELOPES, STRING & BUTTON CLOSURE

For editorial information, see Section 7

Ames Safety Envelope Co., Somerville, Mass.
•Andrews, P. L., Corp., New York
Boston Envelope Co., Dedham, Mass.
Brockton Mfg. Co., Brockton, Mass.
Canada Paper "Wholesale" Ltd., Toronto, Ont.
Cohoes Carrybag Co., Cohoes, N. Y.
Cupples-Hesse Corp., St. Louis, Mo.
Dickinson, John, & Co., Hemel Hempstead, Herts., England
•Equitable Paper Bag Co., Long Island City, N. Y.
Globe Envelopes, Ltd., Toronto, Ont.
Herald Press, Inc., Charlotte, N. C.
Mason Envelope Co., New York
Nebel Paper Products Co., Charlotte, N. C.
Pioneer Valley Plastics Co., Chicopee, Mass.
Prepac, Inc., New York
Royal Paper Corp., New York
Tension Envelope Corp., Kansas City, Mo.
•United States Envelope Co., Springfield, Mass.
Universal Folding Box Co., Hoboken, N. J.
Wolf Detroit Envelope Co., Detroit

ENVELOPES, TRANSPARENT

For editorial information, see Section 7

A ABA Cellophane Products Corp., Pasadena, Calif.
Aladdin Products Co., Woodside, N. Y.
American Kleer-Vu Plastics, Inc., Maspeth, N. Y.
Ames Safety Envelope Co., Somerville, Mass.
•Andrews, P. L., Corp., New York
Austin Industries, Inc., Marlboro, Mass.
Bag-O-Matic Div., Century Engineering Co., Chicago
Bagphane Corp., Brooklyn, N. Y.
Bardes, A. G., Co., Milwaukee
Blossom Mfg. Co., New York
Brockton Mfg. Co., Brockton, Mass.
Brown Bag Filling Machine Co., Fitchburg, Mass.
COSECO, Los Angeles
Canton Containers, Inc., Canton, Ohio
Cello-Masters, Inc., New York
Cellophane Bag & Printing Corp., Brooklyn, N. Y.
•Cellu-Craft Products Corp., New Hyde Park, N. Y.
Clearco Products Co., New York
Clearprint, Inc., New York
Clinwill Plastics, Inc., Buffalo, N. Y.
Collier Mfg. Corp., Div. Warren Featherbone Co., Three Oaks, Mich.
Colonial Envelope Co., New York
Comet Packaging & Paper Co., New York
Crook, William A., Co., Watertown, Mass.
Crystal Tube Corp., Chicago
Cupples-Hesse Corp., St. Louis, Mo.
Dickinson, John, & Co., Hemel Hempstead, Herts., England
Dunmire Packaging Products Co., Los Angeles
Dura-Lee Corp., Kansas City, Mo.
Electronic Wave Products, New York
Emeloid Co., Hillside, N. J.
Herz, Alexander, Co., New York
Kage Co., Manchester, Conn.
Kehr Products Co., Philadelphia
Majikweld Corp., New York
Mason Envelope Co., New York
•Melrose Packaging, New York
•Milprint, Inc., Milwaukee
Myron Mfg. Corp., New York
Neostyle, Inc., Birmingham, Mich.
New Jersey Transparent Co., Newark, N. J.
•Oneida Paper Products, Inc., Clifton, N. J.
Package-Craft, Inc., Paterson, N. J.
Pak-Rite Flexible Packaging Co., New York
Paper Package Co., Indianapolis
Par-Pak Co., Lakewood, Ohio
Pen-Mac-Nye Co., Akron, Ohio
Perry Envelope & Bag Co., New York
Phoenix Products Co., Milwaukee
Pioneer Valley Plastics Co., Chicopee, Mass.
Plastofilm, Inc., Wheaton, Ill.
Prepac, Inc., New York
Print-A-Tube Co., Rochelle Park, N. J.
Protective Lining Corp., New York
•Quatrum Corp., Chicago
Robinson, E. S. & A., (Canada) Ltd., Toronto, Ont.
Rome Plastic Specialties, Inc., Worcester, Mass.
Samson Plastic Products Co., Beverly Hills, Calif.
Schmitz, Henry A., Inc., Ballston Spa, N.Y.
Siris, A. J., Products Corp., New York
Stylecraft Packaging Service, Inc., Charlotte, N. C.
Tower Envelope Co., New York
Transparent Paper Ltd., London, England
•United States Envelope Co., Springfield, Mass.
Utility Plastic Bag Co., Div. Western Burlap Bag Co., Chicago
Vanant Products, Tomah, Wis.
Vizofilm Mfg. Corp., Bronx, N. Y.
W.E.W. Container Co., Brooklyn, N. Y.
Wrapture, Inc., Flushing, N. Y.

JARS, GLASS

For editorial information, see Section 10

•Anchor Hocking Glass Corp., Lancaster, Ohio
•Armstrong Cork Co., Lancaster, Pa.
Atlantic Glass Co., Baltimore, Md.
•Ball Brothers Co., Muncie, Ind.
Brockway Glass Co., Brockway, Pa.
Carr-Lowrey Glass Co., Baltimore, Md.
Consumers Glass Co., Ltd., Montreal, Que.
•Erno Products Co., Philadelphia
Foster-Forbes Glass Co., Marion, Ind.
•Frank, Walter, Elmhurst, Ill.
Gayner Glass Works, Inc., Salem, N. J.
Glass Containers, Inc., San Francisco
•Hazel-Atlas Glass Co., Wheeling, W. Va.
Kerr, Alexander H., & Co., Los Angeles
Knox Glass Associates, Inc., Knox, Pa.
Northwestern Glass Co., Seattle, Wash.
•Owens-Illinois Glass Co., Toledo, Ohio
•Pennsylvania Glass Products Co., Pittsburgh
Richford Corp., New York
Thatcher Glass Mfg. Co., Elmira, N. Y.
Wheaton, T. C., Co., Millville, N. J.

JARS, HOME CANNING

For editorial information, see Section 10

Atlantic Glass Co., Baltimore, Md.
•Ball Brothers Co., Muncie, Ind.
Consumers Glass Co. Ltd., Montreal, Que.
•Erno Products Co., Philadelphia
•Hazel-Atlas Glass Co., Wheeling, W. Va.
Kerr, Alexander H., & Co., Los Angeles
Knox Glass Associates, Inc., Knox, Pa.
Robinson Clay Product Co., Akron, Ohio

JARS, OPAL

For editorial information, see Section 10

•Anchor Hocking Glass Corp., Lancaster, Ohio
Atlantic Glass Co., Baltimore, Md.
Brockway Glass Co., Brockway, Pa.
Carr-Lowrey Glass Co., Baltimore, Md.
•Erno Products Co., Philadelphia
Foster-Forbes Glass Co., Marion, Ind.
•Hazel-Atlas Glass Co., Wheeling, W. Va.
Richford Corp., New York
Wheaton, T. C., Co., Millville, N. J.

JARS, PLASTIC

For editorial information, see Section 8

Boonton Molding Co., Boonton, N. J.
•Bradley Associates, Inc., Chicago
•Colt's Mfg. Co., Hartford, Conn.
D & D Plastics, Inc., Van Dyke, Mich.
•Erno Products Co., Philadelphia
•Frank, Walter, Elmhurst, Ill.
•Imco Container Corp., Kansas City, Mo.
Irwin Corp., Nashua, N. H.
King Plastic Products Corp., College Point, N. Y.
•Lermer Plastics, Inc., Garwood, N. J.
Maryland Plastics, Inc., New York
Massachusetts Plastic Corp., Ludlow, Mass.
Norton Laboratories, Inc., Lockport, N. Y.
•Owens-Illinois Glass Co., Toledo, Ohio
Plastic Container Corp., West Warren, Mass.
Plastomatic Corp., Malvern, Pa.
•Plax Corp., West Hartford, Conn.
Precision Extruders, Leominster, Mass.
Richford Corp., New York
•Royal Mfg. Co., Prescott, Ariz.
Southern California Plastic Co., Glendale, Calif.
Steiner Plastics Mfg. Co., Glen Cove, N. Y.
•Tupper Corp., Blackstone, Mass.
Wheaton Plastics Co., Mays Landing, N. J.
Whyte Mfg. Co., New York
Wilpet Tool & Mfg. Co., Kearny, N. J.

JUGS, GLASS

For editorial information, see Section 10

•Anchor Hocking Glass Corp., Lancaster, Ohio
•Ball Brothers Co., Muncie, Ind.
Brockway Glass Co., Brockway, Pa.
Foster-Forbes Glass Co., Marion, Ind.
Gayner Glass Works, Inc., Salem, N. J.
Glass Containers, Inc., San Francisco
Glenshaw Glass Co., Glenshaw, Pa.
•Hazel-Atlas Glass Co., Wheeling, W. Va.
Kerr, Alexander H., & Co., Los Angeles
Knox Glass Associates, Inc., Knox, Pa.
Northwestern Glass Co., Seattle, Wash.
•Owens-Illinois Glass Co., Toledo, Ohio

PACKETS

(See also Envelopes)

For editorial information, see Section 7

Austin Industries, Inc., Marlboro, Mass.
•Brooks & Porter, Inc., New York
Brown Bag Filling Machine Co., Fitchburg, Mass.
Dickinson, John, & Co., Hemel Hempstead, Herts., England
Fitzhugh, William W., Inc., New York
Homer-Alden Co., No. Attleboro, Mass.
Robinson, E. S. & A., (Canada) Ltd., Toronto, Ont.
•United States Envelope Co., Springfield, Mass.

PADDED SHIPPING BAGS

(See Containers, Insulated)

PAILS, STEEL

For editorial information, see Section 17

•Crown Cork & Seal Co., Can Div., Philadelphia
Jones & Laughlin Steel Corp., Pittsburgh
Republic Steel Corp., Container Div., Niles, Ohio
Rheem Mfg. Co., South Gate, Calif.
Southline Metal Products Co., Houston, Texas
Vulcan Containers, Inc., Bellwood, Ill.
Vulcan Containers Ltd., Toronto, Ont.
Vulcan Steel Container Co., Birmingham, Ala.

PLYWOOD CONTAINERS

(See Containers, Plywood; Crates, Wood & Plywood; Drums; Plywood)

POTTERY CONTAINERS

For editorial information, see Section 16

Ad Art Statuary Co., Cleveland
Brimaur, Elizabethtown, N. Y.
•Emo Products Co., Philadelphia
Louisville Pottery Co., Louisville, Ky.
Robinson Clay Product Co., Akron, Ohio
Western Stoneware Co., Monmouth, Ill.
Zanesville Stoneware Co., Zanesville, Ohio

PULP CONTAINERS

(See Containers, Molded Pulp)

SHIPPING CONTAINERS

(See Bags, Multiwall Heavy-Duty; Barrels, Wooden; Boxes, Nailed Wooden; Boxes, Wirebound Wooden; Carboys; Containers, Corrugated & Solid Fibre; Containers, Plywood; Containers, Shipping, Weatherproof (V-Boxes); Crates; Drums, Fibre, Plywood; Drums & Barrels, Metal)

TRAYS, CELLOPHANE OVERWRAPPED

For editorial information, see Sections 6, 7

AAAAAA-Ace Paper Box Corp., New York
Alton Boxmakers, Inc., St. Louis, Mo.
Andre Paper Box Co., San Francisco
Bestpak, Inc., Natick, Mass.
Bradford, W. J., Paper Co., Chicago
Bradley & Gilbert Co., Louisville, Ky.
Burton Packaging Co., New York
•Chicago Carton Co., Chicago
Comly-Gillam Carton Corp., Philadelphia
Crescent Box Corp., Philadelphia
•Crocker, H. S., Co., San Bruno, Calif.
Crook Paper Box Co., No. Kansas City, Mo.
Day Mfg. Co., Sherman, Texas
Federal Carton Corp., No. Bergen, N. J.
•Fibreboard Products, Inc., San Francisco
Fitzhugh, William W., Inc., New York
Gereke-Allen Carton Co., Div. Eddy Paper Corp., St. Louis, Mo.
Green Bay Box Co., Green Bay, Wis.
Hygrade Folding Box Corp., Woodhaven, N. Y.
Lengsfield Brothers, Inc., New Orleans, La.
•Marathon Corp., Menasha, Wis.
•Milprint, Inc., Milwaukee
•Morris Paper Mills, Chicago
•National Folding Box Co., Sub. Federal Paper Board Co., New York
Nebel Paper Products Co., Charlotte, N C.
Package Supply, Inc., Lansdowne, Pa.
Peerless Packages, Inc., Cleveland
R E B Trays, Inc., Philadelphia
Sherman Paper Products Corp., Newton, Mass.
Sparks Corp., Philadelphia
Spear Box Co., New York
Standard Folding Trays Corp., Jackson Heights, N. Y.
Sturgis Cartons, Inc., Sturgis, Mich.
•Sutherland Paper Co., Kalamazoo, Mich.
Universal Folding Box Co., Hoboken, N. J.

TRAYS, CRIMPED & PRESSED

(Fibre, Foil, Paperboard)

For editorial information, see Section 6

•Animal Trap Co., of America, Lititz, Pa.
Bestpak, Inc., Natick, Mass.
•Chicago Carton Co., Chicago
Collett Sproule Boxes Ltd., Toronto, Ont.
Crook Paper Box Co., No. Kansas City, Mo.
Fonda Container Co., Inc., St. Albans, Vt.
•Indianapolis Paper Corp., Indianapolis
Nebel Paper Products Co., Charlotte, N. C.
•Reynolds Metals Co., Louisville, Ky.
Servon, Inc., New York
•Sutherland Paper Co., Kalamazoo, Mich.
•Sweetnam, George H., Inc., Cambridge, Mass.

TUBES, COLLAPSIBLE

A. *Metal*
B. *Plastic*

For editorial information, see Section 9

Aluminum Co. of America, Pittsburgh (A)
Art Tube Co., Irvington, N. J. (A)
Atlantic Mfg. Co., Newark, N. J. (A)
Baltimore Metal Products, Inc., Brooklyn, N. Y.
•Bradley Container Corp., Maynard, Mass. (B)
•Continental Can Co., Millsplastic Div., Chicago (B)
•Frank, Walter, Elmhurst, Ill. (A)
Michigan Collapsible Tube Co., East Detroit, Mich. (A)
•Peerless Tube Co., Bloomfield, N. J. (A)
Precision Extruders, Leominster, Mass. (B)
•Sheffield Tube Corp., New London, Conn. (A)
Standard Collapsible Tube Co., Rochester, Pa. (A)
•Sun Tube Corp., Hillside, N. J. (A)
Taranger, E., Inc., New York (A)
Univial Corp., Rutherford, N. J. (B)
•Venesta Ltd., London, England (A)
Victor Metal Products Corp., Newport, Ark. (A)
Wallace Container Co., Sub. Continental Can Co., Santa Ana, Calif. (B)
•Wheeling Stamping Co., Wheeling, W. Va. (A)
White Metal Mfg. Co., Hoboken, N. J. (A)
•Wirz, A. H., Inc., Chester, Pa. (A)

TUBES, PAPER OR FIBRE

For editorial information, see Section 6

Ames Bag Co., Selma, Ala.
Ames Safety Envelope Co., Somerville, Mass.
Bowaters Sales Co., London, England
Burnett, R. L., Co., San Antonio, Texas
•Burt, F. N., Co., Buffalo, N. Y.
Cambridge Paper Box Co., Cambridge, Mass.
Chicago Mailing Tube Co., Chicago
Cin-Made Corp., Cincinnati
•Clevèland Container Co., Cleveland
Climax Fibre Drum Co., Carthage, N. Y.
Consolidated Box Co., Tampa, Fla.
Corygnton Products Co., Div. Shoup-Owens, Inc., Hoboken, N. J.
Crescent Paper Tube Co., Covington, Ky.
•Cross Paper Products Corp., New York
•Fibreboard Products, Inc., San Francisco
Fonda Container Co., Inc., St. Albans, Vt.
Forsberg Paper Box Co., Madison, Wis.
Globe Container Co., San Carlos, Calif.
•Harcord Mfg. Co., Jersey City, N. J.
Heminway Corp., Waterbury, Conn.
Improved Mailing Case Co., New York
•Indianapolis Paper Container Corp., Indianapolis
Industrial Steel & Fibre, Ltd., Terrebonne, Que.
Marshall Paper Tube Co., Randolph, Mass.
Master Package Corp., Owen, Wis.
•Mead Corp., Dayton, Ohio
Mercer Paper Tube, Inc., Trenton, N. J.
•Middlesex Paper Tube Co., Lowell, Mass.
Mitchell Paper Products Co., Bloomfield, N. J.
Mullery Paper Packages, Inc., St. Paul, Minn.
•Niemand Bros., Inc., Long Island City, N. Y.
Ohio Paper Products Co., Massillon, Ohio
Packard Container Corp., Hoboken, N. J.
Paper Package Co., Indianapolis
Plastic Packaging Co., Chicago
Platt Corp., Baltimore, Md.
Quality Park Box Co., St. Paul, Minn.
•R. C. Can Co., St. Louis, Mo.
Randolph Paper Box Corp., Richmond, Va.
Ritchie, W. C., & Co., Chicago
•Sefton Fibre Can Co., St. Louis, Mo.
Shadur Box Co., Milwaukee
Sonoco Products Co., Hartsville, S. C.
Spenzer Container Corp., Greenville, Pa.
Spitzer Paper Box Co., Toledo, Ohio
Stecker Paper Box Co., Detroit
Stone Paper Tube Co., Washington, D. C.
Turner Bros., Wellington, Ohio
•United Can Co., Phillipsburg, N. J.
Universal Tube & Container Co., Waltham, Mass.
•Venesta Ltd., London, England

TUBES, SEMI-RIGID PLASTIC

(See Vials, Plastic; Converters of Rigid Plastic Sheet)

TUMBLERS, GLASS

For editorial information, see Section 10

•Anchor Hocking Glass Corp., Lancaster, Ohio
•Armstrong Cork Co., Lancaster, Pa.
•Ball Brothers Co., Muncie, Ind.
Brockway Glass Co., Brockway, Pa.
Corning Glass Works, Corning, N. Y.
•Erno Products Co., Philadelphia
Glass Containers, Inc., San Francisco
•Hazel-Atlas Glass Co., Wheeling, W. Va.
Kerr, Alexander H., & Co., Los Angeles
Knox Glass Associates, Inc., Knox, Pa.
Northwestern Glass Co., Seattle, Wash.
•Owens-Illinois Glass Co., Toledo, Ohio

TUMBLERS, METAL

For editorial information, see Section 9

Basca Mfg. Co., Div. of Huyler's, Indianapolis
Norben, Inc., Indianapolis
•Reynolds Metals Co., Louisville, Ky.

TUMBLERS, MOLDED PLASTIC

For editorial information, see Section 8

Associated Plastic Companies, Inc., Midland, Mich.
Columbus Plastic Products, Inc., Columbus, Ohio
Connecticut Plastic Products Co., Waterbury, Conn.
Dapol Plastics, Inc., Worcester, Mass.
Davies, Harry, Molding Co., Chicago
•Erno Products Co., Philadelphia
Irwin Corp., Nashua, N. H.
Koller Craft Plastic Products, Fenton, Mo.
Maryland Plastics, Inc., New York
Massachusetts Plastic Corp., Ludlow, Mass.
Mid-America Plastics, Inc., Cleveland
Moonglow Novelty Corp., New York
Mutual Plastic Mold Co., South Gate, Calif.
Peoria Plastic Co., East Peoria, Ill.
Plastic Container Corp., West Warren, Mass.
Plastomatic Corp., Malvern, Pa.
•Tri-State Plastic Molding Co., Henderson, Ky.
•Tupper Corp., Blackstone, Mass.
•Vlchek Tool Co., Cleveland
Watertown Mfg. Co., Watertown, Conn.
Wilpet Tool & Mfg. Co., Kearny, N. J.

VIALS, GLASS

For editorial information, see Section 10

Brockway Glass Co., Brockway, Pa.
Corning Glass Works, Corning, N. Y.
Demuth Glass Works, Parkersburg, W. Va.
•Erno Products Co., Philadelphia
Foster-Forbes Glass Co., Marion, Ind.
•Frank, Walter, Elmhurst, Ill.
•Owens-Illinois Glass Co., Toledo, Ohio
•Pennsylvania Glass Products Co., Pittsburgh
Special Glass Products Co., New York
Techniglas, Adamston, N. J.
Univial Corp., Rutherford, N. J.
Wheaton, T. C., Co., Millville, N. J.

VIALS, METAL

For editorial information, see Section 9

Art Tube Co., Irvington, N. J.
•Frank, Walter, Elmhurst, Ill.
Victor Metal Products Corp., Newport, Ark.
White Metal Mfg. Co., Hoboken, N. J.

VIALS, PLASTIC

(Semi-Rigid, Fabricated, Extruded & Molded)

For editorial information, see Section 8

•American Cellubox Corp., Long Island City, N. Y.
•Armstrong Cork Co., Lancaster, Pa.
Associated Plastic Companies, Inc., Midland, Mich.
•Ball Brothers Co., Muncie. Ind.
Bolta Products, Div. The General Tire & Rubber Co., Lawrence, Mass.
Boonton Molding Co., Boonton, N. J.
•Bradley Associates, Inc., Chicago
Brockway Glass Co., Brockway, Pa.
Celluplastic Corp., Newark, N. J.
Chippewa Plastics, Inc., Chippewa Falls, Wis.
Clinwill Plastics, Inc., Buffalo, N. Y.
Connecticut Plastic Products Co., Waterbury, Conn.
Eclipse Plastic Industries, Inc., Sarasota, Fla.
Electronic Wave Products, Inc., New York
•Erno Products Co., Philadelphia
•Extruded Plastics, Inc., Norwalk, Conn.
Falge Engineering Corp., Bethesda, Md.
Frank Paper Products Corp., Detroit
•Frank, Walter, Elmhurst, Ill.
Gemloid Corp., Elmhurst, N. Y.
Hedwin Corp., Baltimore, Md.
Hydrawlik Co., Roselle, N. J.
Irwin Corp., Nashua, N. H.
•J. E. Plastics, Inc., New York
Just Plastics, Inc., New York
•Lermer Plastics, Inc., Garwood, N. J.
•Lusteroid Container Co., Maplewood, N. J.
Maryland Plastics, Inc., New York
Massachusetts Plastic Corp., Ludlow, Mass.
Molded Products Div., Admiral Corp., West Chicago, Ill.
Olympic Plastics Co., Los Angeles
•Owens-Illinois Glass Co., Toledo, Ohio
Park Plastics Co., Linden, N. J.
PharmaPlastics, Inc., Baltimore, Md.
Plastofilm, Inc., Wheaton, Ill.
Plas-Tube Corp., Springdale, Conn.
Polygon Products Co., Chicago
Precision Extruders, Leominster, Mass.
•Royal Mfg. Co., Prescott, Ariz.
Southern Plastics Co., Columbia, S. C.
Steiner Plastics Mfg. Co., Glen Cove, N. Y.
Transparent Plastics Container Co., New York
Univial Corp., Rutherford, N. J.
Weinman Bros., Inc., Chicago
Wheaton Plastics Co., Mays Landing, N. J.
Whyte Mfg. Co., New York
Wildon Industries, Inc., New York
Wilpet Tool & Mfg. Co., Kearny, N. J.

WAXED BAGS

(See Bags, Glassine or Waxed)

WIRE RACKS

(See Displays, Wire)

WIREBOUND BOXES & CRATES

(See Boxes, Wirebound Wooden)

WOODEN SHIPPING CONTAINERS

(See Barrels, Wooden; Boxes, Nailed Wooden; Boxes, Wirebound Wooden; Containers, Plywood; Containers, Veneer; Crates, Wood & Plywood)

DISTRIBUTORS, JOBBERS & SALES AGENTS

(The following companies handle a variety of Containers in a wide quantity range)

Abana Products, Inc., Chicago
Allied Commodities Co., Minneapolis
American Cordage & Paper Corp., New York
Atlantic Glass Co., Baltimore, Md.
Basic Material Supply Co., New York
Biltmore Box & Packaging Products Co., Chicago
Blake, Moffitt & Towne, San Francisco
Bonder Glass & Closure Co., Brooklyn, N. Y.
Bracamonte, R. M., & Co., San Francisco
Bradner Smith & Co., Chicago
Braun, W., Co., Chicago
Burnett, R. L., Co., San Antonio, Texas
Carlyle Container Co., Charlotte, N. C.
Cello-Masters, Inc., New York
Central Ohio Paper Co., Columbus, Ohio
Central Supply Co., Milwaukee
Chicago Paper Co., Chicago
Consolidated Paper Co., Brooklyn, N. Y.
Continental Glass Co., Chicago
Coy, Disbrow & Co., New York
Crown Glass Corp., Chicago
Duff California Co., San Francisco
Exeter Paper Co., Chicago
Filpaco Industries, Inc., Chicago
Flyndustries, Inc., New York
Gayner Glass Works, Inc., Salem, N. J.
Gould, Stephen, Paper Co., Jersey City, N. J.
Halsell Brokerage Co., Denver, Colo.
Hartung, A., & Co., Philadelphia
Hassler, W. Scott, Assoc., Chicago
Hope Paper Co., Brooklyn, N. Y.
Hubbs, Charles F., & Co., Div. Hubbs Corp., Long Island City, N. Y.
Jaymark Paper Co., Hewlett, N. Y.
Kaufman Hoag Co., New York
King, Charles E., & Co., Chicago
Leedpak-Leeds Sales Co., New York
Levine, M. H., Co., New York
Levy, J., New York
Magic City Bottle & Supply, Miami, Fla.
Marks, Edward M., Co., Los Angeles
Minnesota Filler Co., Minneapolis
Northern Glass Co., San Francisco
Package Supply, Inc., Lansdowne, Pa.
Packageers Co., Chicago
Packaging Pioneers, Inc., Tuckahoe, N. Y.
Penn Bottle & Supply Co., Philadelphia
Pierson Assoc., Boston
Ponten, J. S., Co., Oakland, Calif.
Poris, Harry, Co., New York
Posner, S., Sons, Inc., Brooklyn, N. Y.
Post, Herbert A., Long Island City, N. Y.
Rabinowitz, J., & Sons, Inc., Brooklyn, N. Y.
Ross Container & Seal Co., New York
Royce, Stark & Co., Milwaukee
Sager Bros., New York
Spec-Fab Co., Philadelphia
Supreme Ribbon Corp., New York
Thompson, Ltd., New York
Thor Mac, Inc., Chicago
Timely Packaging Assoc., New York
Triangle Container Corp., Chicago
Ullman Bag Co., Detroit, Mich.
United Mineral & Chemical Corp., New York
Utility Plastic Bag Co., Div. Western Burlap Bag Co., Chicago
Vickers, Charles D., & Co., Chicago
Visible Package Sales Corp., Chicago
Weaver Packaging Co., Montrose, Calif.
West Coast Plastics Distributors, Inc., Los Angeles
Wilson, J. W., Glass Co., Brooklyn, N. Y.
Wilson Plastic Container Corp., Brooklyn, N. Y.

Machinery and Equipment

AUXILIARY DEVICES & ATTACHMENTS

A. *Thermostats*
B. *Registration Controls*
C. *Humidily Controls*
D. *Humidity Indicators*
E. *Humidifying Equipment*
F. *Dehumidifiers*
G. *Static Eliminators*
H. *Heating Units*
I. *Dryers*
J. *Sheet Cleaners*
K. *Sprayers*
L. *Web Control*
M. *Clutch-Brakes*
N. *Machine Knives*

For editorial information, see Section 12

Abbeon Supply Co., Jamaica, N. Y. (C, D, E, F, G)
American Instrument Co., Silver Spring, Md. (C, D)
Applied Engineering Assoc., Brooklyn, N. Y. (F, I)
•Black-Clawson Co., Dilts Machine Works Div., Fulton, N. Y. (I, N)
Bristol Co., Waterbury, Conn. (A, C, D)
Cameron Machine Co., Brooklyn, N. Y. (L)
•Champlain Co., Bloomfield, N. J. (B, I)
Converters Machine Co., Greenwich, Conn. (H, I)
Cooper, D. C., Chicago (A, D, H, J)
Culligan, Inc., Desiccant Div., Northbrook, Ill. (D)
Cutler-Hammer, Inc., Milwaukee (A, H, L, M)
Deitz, S. J., Co., River Edge, N. J. (B, L)
Doyle, J. E., Co., Cleveland (G, H, I, J)
Driaire, Inc., So. Norwalk, Conn. (D)
Egan, Frank W., & Co., Somerville, N. J. (B, I, L)
Electric Eye Equipment Co., Danville, Ill. (B, L)
•Electronic Machine Parts, Inc., New York (B)
•Helix Machine Co., Mineola, N. Y. (H)
•Herbert Products, Inc., Woodhaven, N. Y. (A, E, G, H, I)
Hewson Mfg. Co., Newark, N. J. (G)
•Hobbs Mfg. Co., Worcester, Mass. (N)
Holmes Equipment Corp., So. San Francisco (B)
Humidial Co., Colton, Calif. (D)
•International Paper Box Machine Co., Nashua, N. H. (G)
Jeffrey Mfg. Co., Columbus, Ohio (I)
Johnstone Engineering & Machine Co., Parkersburg, Pa. (L)
Korn, Henry P., New York (B)
Lembo Machine Works, Inc., Paterson, N. J. (B, H, I)
Levey, Fred'k H., Co., New York (I)
•MRM Co., Brooklyn, N. Y. (H)
Machine O'Matic, Inc., Chicago (B, L)
Master Appliance Mfg. Co., Racine, Wis. (I)
•Mercury Engineering Corp., Milwaukee (I, K)
Minneapolis-Honeywell Regulator Co., Minneapolis (A, B, C, D, E)
Miskella Infra-Red Co., Cleveland (H, I)
•National Rubber Machinery Co., Akron, Ohio (H)
New Jersey Electronic Co., Passaic, N. J. (B)
•Oxy-Dry Sprayer Corp., Chicago (G, K)
Randall Duster Corp., Rye, N. Y. (K)
Rathbun & Bird Co., New York (G)
Roberts Development Corp., Hanover, Mass. (B, L)
S & S Corrugated Paper Machinery Co., Brooklyn, N. Y. (H, N)
•Simco Co., Lansdale, Pa. (G)
Swiss Industrial Co., Neuhausen Rhine Falls, Switzerland (B, H, I, L)
Testing Machines, Inc., New York (D, E, F, J)
Thermel, Inc., Chicago (H)
•Vulcan Electric Co., Danvers, Mass. (H, I)
Wallace Co., Bridgeport, Conn. (A, C, D, E, F)
Walton Laboratories, Inc., Irvington, N. J. (C, D, E, F)
Warner Electric Brake & Clutch Co., Beloit, Wis. (B, M)
West Instrument Corp., Chicago (A)

CODE MARKING

(See Machines, Numbering, Printing or Perforating)

CONVEYORS

A. *Gravity*
B. *Portable*
C. *Power Driven*

For editorial information, see Sections 11, 18

•Amsco Packaging Machinery, Inc., Long Island City, N. Y. (C)
Applied Engineering Assoc., Brooklyn, N. Y. (C)
Barnes, W. F. & John, Co., Process Equipment Div., Rockford, Ill. (C)
•Biner-Ellison Machinery Co., Los Angeles (C)
Bodinson Mfg. Co., San Francisco (C)
Brady Conveyors Corp., Chicago (C)
Buschman, E. W., Co., Cincinnati (A, B, C)
CPS Mfg. Co., Chicago (C)
Chain Belt Co., Milwaukee (C)
•Chisholm Ryder Co. of Pa., Hanover, Pa. (A)
Codie-Kay Co., Los Angeles (C)
•Colton, Arthur, Co., Detroit (C)
Conveyor Systems, Inc., Chicago (A, B, C)
•Crown Cork & Seal Co., Baltimore, Md. (C)
Cutler-Hammer, Inc., Milwaukee (C)
Dellenbarger Machine Co., New York (A, B, C)
•Doughboy Industries, Inc., New Richmond, Wis. (B, C)
Dudley Corp., Hollister, Calif. (A, C)
Ferguson, Harry J., Co., Jenkintown, Pa. (A, B, C)
•Ferguson, J. L., Co., Joliet, Ill. (A, B, C)
Filler Machine Co., Philmont, Pa. (C)
Filpaco Industries, Inc., Chicago (A, B, C)
Flexoveyor Mfg. Co., Denver, Colo. (B, C)
•Food Machinery & Chemical Corp., San Jose, Calif. (A, B, C)
Globe Mfg. Co., Philadelphia (B)
Griswold & Co., Montreal, Que. (A, B, C)
•Gump, B. F., Co., Chicago (C)
Harrison, Nealis, Ltd., Hull, Yorkshire, England (A, B, C)
Hartig Engine & Machine Co., Hillside, N. J. (C)
Haslett Chute & Conveyor Co., Oaks, Pa. (A, B, C)
•Helix Machine Co., Mineola, N. Y. (C)
•Herbert Products, Inc., Woodhaven, N. Y. (B)
Hi-Speed Checkweigher Co., Ithaca, N. Y. (C)
Holmes Equipment Corp., So. San Francisco (C)
•Horix Mfg. Co., Pittsburgh (A, B, C)
Horne, E. C., Machinery Co., Denver, Colo. (B, C)
•Island Equipment Corp., Long Island City, N. Y. (A, B, C)
Jeffrey Mfg. Co., Columbus, Ohio (C)
Johnson, Gordon, Co., Kansas City, Mo. (C)
•Karstrom, Paul L., Co., Chicago (C)
Kiefer, Karl, Machine Co., Cincinnati (C)
Lamson Corp., Syracuse, N. Y. (A)
Link-Belt Co., Chicago (C)
Liquid Carbonic Corp., Chicago (C)
Little, H. C., Burner Co., San Rafael, Calif. (B, C)
Logan Co., Louisville, Ky. (A, C)
M-H Standard Co., Jersey City, N. J. (B, C)
Magline, Inc., Pinconning, Mich. (B)
Mathews Conveyor Co., Ellwood City, Pa. (A, B, C)
Mercury Conveyor, Inc., Hillside, N. J. (B, C)
•Mercury Heat Sealing Equipment Co., Philadelphia (C)
Meyer, Geo. J., Mfg. Co., Cudahy, Wis. (C)
Modern Plastic Machinery Corp., Lodi, N. J. (C)
•Mojonnier Associates, Inc., Franklin Park, Ill. (C)
Moore, Kenneth J., & Co., Chicago (C)
•National Rubber Machinery Co., Akron, Ohio (C)
Neuman, J. John, Engineering & Mfg. Co., Yorktown Heights, N. Y. (C)
Oliver Corp., A. B. Farquar Div., York, Pa. (A, B, C)
Olson, Samuel, Mfg. Co., Chicago (A, B, C)
•PMC, Inc., (formerly Progressive Machine Co.), Hackensack, N. J. (C)
Palmer-Bee Co., Detroit (C)
Paramount Mfg. Co., Stockton, Calif. (A, B, C)
•Potdevin Machine Co., Teterboro, N. J. (B)
Power-Curve Conveyor Co., Denver, Colo. (B, C)
Purdy Machinery Co., London, England (A, B, C)
Rapids-Standard Co., Grand Rapids, Mich. (A, B, C)
•Rex Packaging Machine Co., Elizabeth, N. J. (C)
S & S Corrugated Paper Machinery Co., Brooklyn, N. Y. (C)
Sage Equipment Co., Buffalo, N. Y. (A, B, C)
•Sanford, William B., Inc., New York (A, B, C)

Scientific Filter Co., New York (C)
Smith & Winchester Mfg. Co., So. Windham, Conn. (C)
Standard Conveyor Co., No. St. Paul, Minn. (A, B, C)
Stephens-Adamson Mfg. Co., Aurora, Ill. (B, C)
Tite-Cap Machine Co., New York (C)
•Trescott Co., Fairport, N. Y. (B, C)
Tri-Pak Machinery Service, Inc., Harlingen, Texas (A, B, C)
Union Steel Products Co., Albion, Mich. (B, C)
•U. S. Bottlers Machinery Co., Chicago (B, C)
•U. S. Engineering Co., Long Island City, N. Y. (C)
Webb, Jervis B., Co., Detroit (C)
Weber, H. G., & Co., Kiel, Wis. (C)
Weigh Right Automatic Scale Co., Joliet, Ill. (C)
West Bend Equipment Corp., West Bend, Wis. (C)
White, R. G., Mfg. Corp., Ozone Park, N. Y. (C)
Wilcox Mfg. Co., Stockton, Calif. (C)
Woodman Co., Decatur, Ga. (B, C)

DIES, PAPER CUTTING

For editorial information, see Sections 13, 14

•Bell Machine Co., Oshkosh, Wis.
Craftsmen Machinery Co., Boston
Dellenbarger Machine Co., New York
Helmold, J. F., & Bro., Inc., Chicago
•Richards, J. A., Co., Kalamazoo, Mich.
Staff Die Cutting Co., New York
Weber, H. G., & Co., Kiel, Wis.

EQUIPMENT, AIR PUMPS

(For Suction & Pressure)

For editorial information, see Section 12

Allis-Chalmers Mfg. Co., Milwaukee
•Biner-Ellison Machinery Co., Los Angeles
Dexter Folder Co., New York
Leiman Bros., Inc., Newark, N. J.
•New Jersey Machine Corp., Hoboken, N. J.
Squire-Cogswell Co., Chicago

EQUIPMENT, MATERIALS HANDLING

For editorial information, see Sections 11, 18

Acme Pallet Co., New York
•Acme Steel Co., Chicago
Aerol Co., Los Angeles
Applied Engineering Assoc., Brooklyn, N. Y.
Automatic Transportation Co., Chicago
Barber-Greene Co., Aurora, Ill.
Barnes, W. F. & John, Co., Process Equipment Div., Rockford, Ill.
Bay Products, Inc., Philadelphia
Big Joe Mfg. Co., Chicago
•Black-Clawson Co., Dilts Machine Works Div., Fulton, N. Y.
Bodinson Mfg. Co., San Francisco
Brady Conveyors Corp., Chicago
Buda Div., Allis-Chalmers Mfg. Co., Harvey, Ill.
Buschman, E. W., Co., Cincinnati
CPS Mfg. Co., Chicago
Chain Belt Co., Milwaukee
Clark Equipment Co., Battle Creek, Mich.
Clark, George P., Co., Windsor Locks, Conn.
Colson Corp., Elyria, Ohio
Cooper, D. C., Chicago
•Counsel Machine Co., Wallington, N. J.
Crowe Engineering Co., Cincinnati
Dellenbarger Machine Co., New York
Driver, George, & Son Ltd., Wembley, Middx., England
Drum Equipment Corp., Union, N. J.
Dudley Corp., Hollister, Calif.
Economy Engineering Co., Chicago
Elizabeth Iron Works, Inc., Union, N. J.
Elwell-Parker Electric Co., Cleveland
Fab-Weld Corp., Philadelphia
Factory Service Co., Milwaukee
Fairbanks Co., New York
Filpaco Industries, Inc., Chicago
Flexoveyor Mfg. Co., Denver, Colo.
•Food Machinery & Chemical Corp., San Jose, Calif.
Guide Co., Canfield, Ohio
Hamilton Caster & Mfg. Co., Hamilton, Ohio
Harnischfeger Corp., Milwaukee
Holmes Equipment Corp., So. San Francisco
Howe Scale Co., Rutland, Vt.
Hyster Co., Portland, Ore.
•Island Equipment Corp., Long Island City, N. Y.
Jeffrey Mfg. Co., Columbus, Ohio
Lamson Corp., Syracuse, N. Y.
Lewis-Shepard Products, Inc., Watertown, Mass.
Lift Trucks, Inc., Cincinnati
Link-Belt Co., Chicago
Logan Co., Louisville, Ky.
Louden Machinery Co., Fairfield, Iowa
M-H Standard Co., Jersey City, N. J.
Magline, Inc., Pinconning, Mich.
Mercury Conveyor, Inc., Hillsdale, N. J.
Mercury Mfg. Co., Chicago
Modern Equipment Co., Omaha, Neb.
Moto-Truc Co., Cleveland
Nutting Truck & Caster Co., Faribault, Minn.
Palmer-Bee Co., Detroit
Paltier Corp., Michigan City, Ind.
Power-Curve Conveyor Co., Denver, Colo.
Purdy Machinery Co., London, England
Re-Bo Mfg. Co., New York
Revolvator Co., No. Bergen, N. J.
Richardson Scale Co., Clifton, N. J.
Roura Iron Works, Inc., Detroit
S & S Corrugated Paper Machinery Co., Brooklyn, N. Y.
Skarnes Engineering & Supply, Inc., Minneapolis
Speedways Conveyors, Inc., Buffalo, N. Y.
Standard Conveyor Co., No. St. Paul, Minn.
Stephens-Adamson Mfg. Co., Aurora, Ill.
Syntron Co., Homer City, Pa.
Thayer Scale & Engineering Corp., Rockland, Mass.
Tri-Pak Machinery Service, Inc., Harlingen, Texas
Triplex Industries, Inc., Chicago
Webb, Jervis B., Co., Detroit
West Bend Equipment Corp., West Bend, Wis.
White, R. G., Mfg. Corp., Ozone Park, N. Y.
Yale & Towne Mfg. Co., Philadelphia

HAMMERS & TACKERS, AUTOMATIC FEED

For editorial information, see Sections 12, 18

Container Stapling Corp., Herrin, Ill.
Heller Co., Cleveland
Lotz, Abbott & Co., London, England

HANDLING EQUIPMENT, MATERIALS

(See Equipment, Materials Handling)

HEAT SEALERS, AUTOMATIC

(See Machines, Heat Sealing, Complete & Separate Units)

HEAT SEALERS, HAND IRONS

For editorial information, see Section 11

•Amsco Packaging Machinery, Inc., Long Island City, N. Y.
Chaffee, Ralph, & Co., San Francisco
Cleveland Lathe & Machine Co., Cleveland
Casting Masters, Inc., Chicago
Cooper, D. C., Chicago
•Doughboy Industries, Inc., New Richmond, Wis.
General Machinery Corp., Sheboygan, Wis.
•Globe Heat-Seal, Inc., Los Angeles
•Great Lakes Stamp & Mfg. Co., Chicago
Ideal Packagings, Ltd., London, England
•Karstrom, Paul L., Co., Chicago
M & R Mfg. Co., Mansfield, Ohio
•Mercury Heat Sealing Equipment Co., Philadelphia
Miller Wrapping & Sealing Machine Co., Chicago
•Pack-Rite Machines, Milwaukee
•Product Packaging Engineering, Culver City, Calif.
Thermel, Inc., Chicago
•Trescott Co., Fairport, N. Y.
•Vulcan Electric Co., Danvers, Mass.

HEAT SEALERS, HOT PLATES

For editorial information, see Section 11

•Amsco Packaging Machinery, Inc., Long Island City, N. Y.
Casting Masters, Inc., Chicago
Chaffee, Ralph, & Co., San Francisco
Cleveland Lathe & Machine Co., Cleveland
Cooper, D. C., Chicago
•Globe Heat-Seal, Inc., Los Angeles
•Great Lakes Stamp & Mfg. Co., Chicago
Ideal Packagings, Ltd., London, England
Johnson, Gordon, Co., Kansas City, Mo.
•Karstrom, Paul L., Chicago
•Mercury Heat Sealing Equipment Co., Philadelphia
Miller Wrapping & Sealing Machine Co., Chicago
Miskella Infra-Red Co., Cleveland
•Oliver Machinery Co., Grand Rapids, Mich.
Thermel, Inc., Chicago
•Trescott Co., Fairport, N. Y.
•Vulcan Electric Co., Danvers, Mass.

LABELERS

(See Machines, Labeling)

MACHINES, AEROSOL LOADING

For editorial information, see Section 11

Doran Bros., Inc., Danbury, Conn.
Elgin Mfg. Co., Elgin, Ill.
Hope Machine Co., Philadelphia
•MRM Co., Brooklyn, N. Y.
•Mojonnier Associates, Inc., Franklin Park, Ill.
National Instrument Co., Baltimore, Md.
•Oil Equipment Laboratories, Inc., Elizabeth, N. J.
•Sanford, William B., Inc., New York

MACHINES, AMPUL FILLING & SEALING

For editorial information, see Section 11

Chase Equipment Corp., New York
Cozzoli Machine Co., Plainfield, N. J.
Kahlenberg Globe Equipment Co., Sarasota, Fla.
National Instrument Co., Baltimore, Md.
Perl Machine Mfg. Co., Brooklyn, N. Y.
Pharmaceutical & Chemical Industry Supply Corp., New York
•Popper & Sons, Inc., New York

MACHINES, AMPUL PRINTING

For editorial information, see Section 12

•Apex Machine Co., College Point, N. Y.
•Markem Machine Co., Keene, N. H.
Meisel Press Mfg. Co., Boston
Pharmaceutical & Chemical Industry Supply Corp., New York
•Popper & Sons, Inc., New York
Rutherford Machinery Co., Div. Sun Chemical Corp., Long Island City, N. Y.

MACHINES, AMPUL WASHING

For editorial information, see Section 11

Cozzoli Machine Co., Plainfield, N. J.
Hill, Thomas, Engineering Co., Hull, Yorkshire, England
Pharmaceutical & Chemical Industry Supply Corp., New York
•Popper & Sons, Inc., New York
•U. S. Bottlers Machinery Co., Chicago

MACHINES, BAG OR ENVELOPE CLOSING & SEALING

For editorial information, see Section 11

•Amsco Packaging Machinery, Inc., Long Island City, N. Y.
B & D Bag Tying Machine Co., Roxbury, Mass.
•Bell Machine Co., Oshkosh, Wis.
Brecknell, Dolman & Rogers, Ltd., Bristol, England
Brown Bag Filling Machine Co., Fitchburg, Mass.
Chaffee, Ralph, & Co., San Francisco
Consolidated Packaging Machinery Corp., Buffalo, N. Y.
Dexter Folder Co., New York
Electronic Processes Corp., Los Altos, Calif.
•Fry, George H., Co., Mineola, N. Y.
•Geveke & Co., New York
•Globe Heat-Seal, Inc., Los Angeles
Griswold & Co., Montreal, Que.
•Gump, B. F., Co., Chicago
•Hesser, Fr., Maschinenfabrik Aktiengesellschaft, Stuttgart-Bad Cannstatt, Germany
Hilker Products Corp., New York
Holmes Equipment Corp., So. San Francisco
Howard Plastics, Inc., Council Bluffs, Iowa
Ideal Packagings Ltd., London, England
•Industrie-Werke Karlsruhe, Karlsruhe, Germany
International Paper Co., Bagpak Div., New York
Kartridg-Pak Machine Co., Chicago
Kwik Lok Corp., Yakima, Wash.
Lindstaedt Laboratories, San Anselmo, Calif.
Little, H. C., Burner Co., San Rafael, Calif.
•Mercury Heat Sealing Equipment Co., Philadelphia
Miller Wrapping & Sealing Machine Co., Chicago
Neuman, J. John, Engineering & Mfg. Co., Yorktown Heights, N. Y.
Niagara Packaging Machinery Corp., Depew, N. Y.
Packaging Industries, Montclair, N. J.
•Peters Machinery Co., Chicago
Plageman Enterprises, Willoughby, Ohio
•Plas-Ties Co., Santa Ana, Calif.
•Richter, Frederic A., Chicago
St. Regis Paper Co., New York
•Sanford, William B., Inc., New York
•Simplex Packaging Machinery, Inc., Oakland, Calif.
Singer Sewing Machine Co., New York
•Stokes & Smith Co., Sub. Food Machinery & Chemical Corp., Philadelphia
•Trescott Co., Fairport, N. Y.
•Triangle Package Machinery Co., Chicago
•Vac-Tie Fasteners, Inc., Elizabeth, N. J.
•Vertrod Corp., Brooklyn, N. Y.
Woodman Co., Decatur, Ga.
•Wrap-Ade Machine Co., Belleville, N. J.
•Wright Machinery Co., Durham, N. C.

MACHINES, BAG OR ENVELOPE FILLING

For editorial information, see Section 11

•Arenco Machine Co., New York
•Amsco Packaging Machinery, Inc., Long Island City, N. Y.
Automatic Scale Co., New York
•Bartelt Engineering Co., Rockford, Ill.
•Bell Machine Co., Oshkosh, Wis.
Black Products Co., Chicago
Bowaters Sales Co., London, England
Brecknell, Dolman & Rogers, Ltd., Bristol, England
Brown Bag Filling Machine Co., Fitchburg, Mass.
Burt, F. L., Co., San Francisco
•Coddington, E. D., Mfg. Co., Milwaukee
Codie-Kay Co., Los Angeles
Consolidated Packaging Machinery Corp., Buffalo, N. Y.
Constructions Industrielles de Precision, Paris, France
Driver, George, & Son Ltd., Wembley, Middx., England
Dudley Corp., Hollister, Calif.
•Errich International Corp., New York
Exact Weight Scale Co., Columbus, Ohio
•Ferguson, J. L., Co., Joliet, Ill.
•Food Machinery & Chemical Corp., San Jose, Calif.
•Frazier & Son, Clifton, N. J.
•Geveke & Co., New York
•Gump, B. F., Co., Chicago
•Hesser, Fr., Maschinenfabrik Aktiengesellschaft, Stuttgart-Bad Cannstatt, Germany
Holmes Equipment Corp., So. San Francisco
Ideal Packagings, Ltd., London, England
•Industrie-Werke Karlsruhe, Karlsruhe, Germany
Johnson, Gordon, Co., Kansas City, Mo.
•Karstrom, Paul L., Co., Chicago
Kartridg-Pak Machine Co., Chicago
Lindstaedt Laboratories, San Anselmo, Calif.
Little, H. C., Burner Co., San Rafael, Calif.
Mateer, G. Diehl, Co., Strafford, Wayne, Pa.
Miller Wrapping & Sealing Machine Co., Chicago
Neuman, J. John, Engineering & Mfg. Co., Yorktown Heights, N. Y.
Niagara Packaging Machinery Corp., Depew, N. Y.
Paramount Mfg. Co., Stockton, Calif.
Plageman Enterprises, Willoughby, Ohio
Richardson Scale Co., Clifton, N. J.
St. Regis Paper Co., New York
•Sanford, William B., Inc., New York
•Simplex Packaging Machinery, Inc., Oakland, Calif.
•Stokes & Smith Co., Sub. Food Machinery & Chemical Corp., Philadelphia
Stuyvesant Engineering Co., Lyndhurst, N. J.
Tanzi, Aurelio, Corp., Brooklyn, N. Y.
•Tele-Sonic Packaging Corp., New York
Thayer Scale & Engineering Corp., Rockland, Mass.
•Trescott Co., Fairport, N. Y.
•Triangle Package Machinery Co., Chicago
Union Bag & Paper Corp., New York
•U. S. Automatic Box Machinery Co., Boston
Weigh Right Automatic Scale Co., Joliet, Ill.
Woodman Co., Decatur, Ga.
•Wright Machinery Co., Durham, N. C.

MACHINES, BAG OR ENVELOPE MAKING, FILLING & CLOSING

For editorial information, see Section 11

•Amsco Packaging Machinery, Inc., Long Island City, N. Y.
•Bartelt Engineering Co., Rockford, Ill.
•Bell Machine Co., Oshkosh, Wis.
•Counsel Machine Co., Wallington, N. J.
Delamere & Williams Co., Ltd., Toronto, Ont.
•Food Machinery & Chemical Corp., San Jose, Calif.
General Packaging Equipment Co., Houston, Texas
•Geveke & Co., New York
•Hayssen Mfg. Co., Sheboygan, Wis.
•Hesser, Fr., Maschinenfabrik Aktiengesellschaft, Stuttgart-Bad Cannstatt, Germany
Holmes Equipment Corp., So. San Francisco
•Industrie-Werke Karlsruhe, Karlsruhe, Germany
•Karstrom, Paul L., Co., Chicago
Lindstaedt Laboratories, San Anselmo, Calif.
•Mercury Heat Sealing Equipment Co., Philadelphia
Miller Wrapping & Sealing Machine Co., Chicago
•Package Machinery Co., Springfield, Mass.
Packmasters, Akron, Ohio
•Pak-Rapid, Inc., Philadelphia
•Pneumatic Scale Corp., Quincy, Mass.
•Sanford, William B., Inc., New York
•Simplex Packaging Machinery, Inc., Oakland, Calif.
•Stokes & Smith Co., Sub. Food Machinery & Chemical Corp., Philadelphia
Swiss Industrial Co., Neuhausen Rhine Falls, Switzerland
Tanzi, Aurelio, Corp., Brooklyn, N. Y.
Weber, H. G., & Co., Kiel, Wis.

MACHINES, BAG OR ENVELOPE OPENING

For editorial information, see Section 11

•Amsco Packaging Machinery, Inc., Long Island City, N. Y.
Anderson Bros. Mfg. Co., Rockford, Ill.
Constructions Industrielles de Precision, Paris, France
•Errich International Corp., New York
•Gump, B. F., Co., Chicago
Holmes Equipment Corp., So. San Francisco
Lindstaedt Laboratories, San Anselmo, Calif.
Little, H. C., Burner Co., San Rafael, Calif.
•Tele-Sonic Packaging Corp., New York
•Trescott Co., Fairport, N. Y.
Woodman Co., Decatur, Ga.

MACHINES, BAG MAKING

For editorial information, see Sections 11, 13

•Amsco Packaging Machinery, Inc., Long Island City, N. Y.
Bagprint Machinery Corp., Sub. Valley Iron Works Co., Appleton, Wis.
•Bartelt Engineering Co., Rockford, Ill.
Beasley, French & Co., New York
Chaffee, Ralph, & Co., San Francisco
Cobden Chadwick Ltd., Oldham, Lancs., England
Converters Machine Co., Greenwich, Conn.
Electronic Processes Corp., Los Altos, Calif.
•Food Machinery & Chemical Corp., San Jose, Calif.
•Geveke & Co., New York

•Globe Heat-Seal, Inc., Los Angeles
•Heinrich, H. H., Co., New York
Hilker Products Corp., New York
Holmes Equipment Corp., So. San Francisco
Howard Plastics, Inc., Council Bluffs, Iowa
Ideal Packagings Ltd., London, England
Lotz, Abbott & Co., London, England
•Manhasset Machine Co., Mineola, N. Y.
Miller Wrapping & Sealing Machine Co., Chicago
Modern Packages, Inc., Los Angeles
Moore, Kenneth J., & Co., Chicago
PNR Corp., Cleveland
Packaging Industries, Montclair, N. J.
•Potdevin Machine Co., Teterboro, N. J.
•Product Packaging Engineering, Culver City, Calif.
•Richter, Frederic A., Chicago
Roto Bag Machine Corp., New York
St. Regis Paper Co., New York
•Simplex Packaging Machinery, Inc., Oakland, Calif.
Singer Sewing Machine Co., New York
Smith & Winchester Mfg. Co., So. Windham, Conn.
Union Special Machine Co., Chicago
Van der Meulen, G., & Zn. N.V., Amsterdam, Holland
•Vertrod Corp., Brooklyn, N. Y.
Weber, H. G., & Co., Kiel, Wis.
•Wolverine Paper Converting Machinery Corp., Detroit

MACHINES, BAG SEWING

For editorial information, see Section 13

Consolidated Packaging Machinery Corp., Buffalo, N. Y.
Fishbein, Dave, Co., Minneapolis
International Paper Co., Bagpak Div., New York
•Potdevin Machine Co., Teterboro, N. J.
St. Regis Paper Co., New York
Singer Sewing Machine Co., New York
Smith & Winchester Mfg. Co., So. Windham, Conn.
Union Special Machine Co., Chicago

MACHINES, BAG STAPLING

For editorial information, see Section 12

Acme Staple Co., Camden, N. J.
•Acme Steel Co., Chicago
Bates Mfg. Co., Orange, N. J.
•Bostitch, Westerly, R. I.
Burgess Fastening Co., Cleveland
Codie-Kay Co., Los Angeles
Diagraph-Bradley Industries, Inc., Herrin, Ill.
Ideal Stitcher Co., Div. W. R. Pabich Mfg. Co., Chicago
•Inland Wire Products Co., Chicago
Lotz, Abbott & Co., London, England
Pabich, W. R., Mfg. Co., Chicago
Producers Exchange, Inc., Toledo, Ohio
Vickers-Armstrongs Ltd., London, England
Woodman Co., Decatur, Ga.

MACHINES, BAG VALVING

For editorial information, see Sections 11, 13

Exact Weight Scale Co., Columbus, Ohio
•Heinrich, H. H., Co., New York
•Potdevin Machine Co., Teterboro, N. J.
St. Regis Paper Co., New York

MACHINES, BANDING & WIRE STRAPPING

For editorial information, see Section 18

•Acme Steel Co., Chicago
Dellenbarger Machine Co., New York
Gerrard, A. J., & Co., Melrose Park, Ill.
•Inland Wire Products Co., Chicago
Stanley Works, Steel Strapping Div., New Britain, Conn.

MACHINES, BOTTLE CLEANING

A. *Air*
B. *Washing*

For editorial information, see Section 11

•Chisholm Ryder Co. of Pa., Hanover, Pa. (A, B)
Cozzoli Machine Co., Plainfield, N. J. (A, B)
Delamere & Williams Co., Ltd., Toronto, Ont. (A, B)
Eyrle Co., San Francisco (A, B)
Filler Machine Co., Philmont, Pa. (A)
Hill, Thomas, Engineering Co., Hull, Yorkshire, England (A, B)
Hope Machine Co., Philadelphia (A)
Kiefer, Karl, Machine Co., Cincinnati (A, B)
Liquid Carbonic Corp., Chicago (B)
•MRM Co., Brooklyn, N. Y. (A)
Metal Closures, Ltd., West Bromwich, Staffs., England (B)
Meyer, Geo. J., Mfg. Co., Cudahy, Wis. (B)
Perl Machine Mfg. Co., Brooklyn, N. Y. (A, B)
Pharmaceutical & Chemical Industry Supply Corp., New York (B)
•Pneumatic Scale Corp., Quincy, Mass. (A)
•Popper & Sons, Inc., New York (B)
•Sanford, William B., Inc., New York (A)
•Standard-Knapp, Div. Emhart Mfg. Co., Portland, Conn. (A, B)
•U. S. Bottlers Machinery Co., Chicago (A, B)
White Cap Co., Chicago (A)

MACHINES, BOTTLE FILLING, LIQUID

(See Machines, Filling, Liquid)

MACHINES, BOW MAKING

For editorial information, see Section 16

Minnesota Mining & Mfg. Co., St. Paul, Minn.
Tymatics, Inc., Dallas, Texas

MACHINES, BOX COLLAPSING

For editorial information, see Sections 11, 13

•International Paper Box Machine Co., Nashua, N. H.
•U. S. Automatic Box Machinery Co., Boston

MACHINES, BOX MAKING

(*Folding*)

For editorial information, see Section 13

•Champlain Co., Bloomfield, N. J.
•Ferguson, J. L., Co., Joliet, Ill.
•Geveke & Co., New York
•Inman Mfg. Co., Amsterdam, N. Y.
•International Paper Box Machine Co., Nashua, N. H.
•Mercury Engineering Corp., Milwaukee
Meyer-Clement, Inc., Oak Park, Ill.
Niagara Packaging Machinery Corp., Depew, N. Y.
•Package Machinery Co., Springfield, Mass.
•Post Machinery Co., Beverly, Mass.
R E B Trays, Inc., Philadelphia
Specialty Automatic Machine Corp., Chelsea, Mass.
•Staude, E. G., Mfg. Co., St. Paul, Minn.
Thrissell Engineering Co., Bristol, England
•U. S. Automatic Box Machinery Co., Boston
Vickers-Armstrongs Ltd., London, England

MACHINES, BOX MAKING

(*Set-Up*)

For editorial information, see Section 13

Delamere & Williams Co., Toronto, Ont.
•Food Machinery & Chemical Corp., San Jose, Calif.
•Geveke & Co., New York
Globe Mfg. Co., Philadelphia
High Production Machine Co., Div. E. G. Staude Mfg. Co., St. Paul, Minn.
•Inman Mfg. Co., Amsterdam, N. Y.
Kingsbury & Davis Machine Co., Contoocook, N. H.
•Knowlton, M. D., Co., Rochester, N. Y.
•Mercury Engineering Corp., Milwaukee
Meyer-Clement, Inc., Oak Park, Ill.
•Peters Machinery Co., Chicago
•Rex Packaging Machine Co., Elizabeth, N. J.
Standard Paper Box Machine Co., New York
•Staude, E. G., Mfg. Co., St. Paul, Minn.
•Stokes & Smith Co., Sub. Food Machinery & Chemical Corp., Philadelphia
Vickers-Armstrongs Ltd., London, England

MACHINES, BOX MAKING CORRUGATED

(*Adjustable for size*)

For editorial information, see Section 13

•Colt's Mfg. Co., Hartford, Conn.
•Food Machinery & Chemical Corp., San Jose, Calif.
General Corrugated Machinery Co., Palisades Park, N. J.
•Geveke & Co., New York
Hooper, F. X., Co., Glenarm, Md.
Langston, Samuel M., Co., Camden, N. J.
•Post Machinery Co., Beverly, Mass.
S & S Corrugated Paper Machinery Co., Brooklyn, N. Y.
Thrissell Engineering Co., Bristol, England
Vickers-Armstrongs Ltd., London, England

MACHINES, BOX STAYING

(*Stay Tape*)

For editorial information, see Section 13

•Food Machinery & Chemical Corp., San Jose, Calif.
•Knowlton, M. D., Co., Rochester, N. Y.
S & S Corrugated Paper Machinery Co., Brooklyn, N. Y.
Standard Paper Box Machine Co., New York
•Stokes & Smith Co., Sub. Food Machinery & Chemical Corp., Philadelphia
Vickers-Armstrongs Ltd., London, England

MACHINES, BOX WINDOW APPLYING

For editorial information, see Section 13

•Geveke & Co., New York
•Hesser, Fr., Maschinenfabrik A. G., Stuttgart-Bad Cannstatt, Germany
High Production Machine Co., Div. E. G. Staude Mfg. Co., St. Paul, Minn.
•International Paper Box Machine Co., Nashua, N. H.
•Staude, E. G., Mfg. Co., St. Paul, Minn.

MACHINES, BUNDLING

For editorial information, see Section 11

•Amsco Packaging Machinery, Inc., Long Island City, N. Y.
•Battle Creek Packaging Machines, Inc., Battle Creek, Mich.
Brainard Steel Div., Sharon Steel Corp., Warren, Ohio
Brecknell, Dolman & Rogers, Ltd., Bristol, England

Constructions Industrielles de Precision, Paris, France
Dellenbarger Machine Co., New York
Gerrard, A. J., & Co., Melrose Park, Ill.
•Geveke & Co., New York
Guide Co., Canfield, Ohio
•Hayssen Mfg. Co., Sheboygan, Wis.
•Hesser, Fr., Maschinenfabrik A. G., Stuttgart-Bad Cannstatt, Germany
•Inland Wire Products Co., Chicago
Miller Wrapping & Sealing Machine Co., Chicago
•Oliver Machinery Co., Grand Rapids, Mich.
•Package Machinery Co., Springfield, Mass.
Paper Converting Machine Co., Green Bay, Wis.
•Rosenthal Mfg. Co., Chicago
St. Regis Paper Co., New York
Scandia Mfg. Co., No. Arlington, N. J.
Schooler Mfg. Co., Burbank, Calif.

MACHINES, CAN CLOSING

For editorial information, see Section 11

American Can Co., New York
Ams, Max, Machine Co., Bridgeport, Conn.
Angelus Sanitary Can Machine Co., Los Angeles
Barnes, W. F. & John, Co., Process Equipment Div., Rockford, Ill.
Continental Can Co., Metal Div., New York
Crandall Can Filler Machine Co., Buffalo, N. Y.
•Ferguson, J. L., Co., Joliet, Ill.
Hope Machine Co., Philadelphia
Kiefer, Karl, Machine Co., Cincinnati
Metal Box Co., London, England
•National Can Corp., Chicago
National Tin Can Mfy. Co., New York
•Oil Equipment Laboratories, Inc., Elizabeth, N. J.
•PMC, Inc., (formerly Progressive Machine Co.,) Hackensack, N. J.
•Sanford, William B., Inc., New York
Tite-Cap Machine Co., New York

MACHINES, CAN FILLING, LIQUID

(See Machines, Filling, Liquid)

MACHINES, CAN LABELING

For editorial information, see Section 11

Burt Machine Co., Baltimore, Md.
•Chisholm-Ryder Co. of Pa., Hanover, Pa.
Dumatic Industries, Philadelphia
•MRM Co., Brooklyn, N. Y.
Moore, Kenneth J., & Co., Chicago
•Potdevin Machine Co., Teterboro, N. J.
Purdy Machinery Co., London, England
•Sanford, William B., Inc., New York
•Standard-Knapp, Div. Emhart Mfg. Co., Portland, Conn.

MACHINES, CAN MAKING

For editorial information, see Section 13

Ams, Max, Machine Co., Bridgeport, Conn.
Angelus Sanitary Can Machine Co., Los Angeles
•Baldwin-Lima-Hamilton Corp., Hamilton, Ohio
Bliss, E. W., Co., Canton, Ohio
Metal Box Co., London, England
Van Leer's Vatenfabrieken N.V., Amsterdam, Holland

MACHINES, CAN SEALING

For editorial information, see Section 11

American Can Co., New York
Ams, Max, Machine Co., Bridgeport, Conn.
Angelus Sanitary Can Machine Co., Los Angeles
Bliss, E. W., Co., Canton, Ohio
•Dewey & Almy Chemical Co., Div. W. R. Grace & Co., Cambridge, Mass.
Niagara Packaging Machinery Corp., Depew, N. Y.
•PMC, Inc., (formerly Progressive Machine Co.), Hackensack, N. J.
•Resina Automatic Machinery Co., Brooklyn, N. Y.
Scientific Filter Co., New York
Tite-Cap Machine Co., New York
Van Leer's Vatenfabrieken N.V., Amsterdam, Holland

MACHINES, CAN WRAPPING

For editorial information, see Section 11

Holmes Equipment Corp., So. San Francisco
•Packaging Machinery Co., Springfield, Mass.
•Redington, F. B., Co., Bellwood, Ill.

MACHINES, CAP & COVER LINING

For editorial information, see Section 13

•Arenco Machine Co., New York
•Baldwin-Lima-Hamilton Corp., Hamilton, Ohio
•Bell Machine Co., Oshkosh, Wis.
•Dewey & Almy Chemical Co., Div. W. R. Grace & Co., Cambridge, Mass.
Johnson, A., Machine Works, Inc., East Paterson, N. J.

MACHINES, CAPPING

A. *Bottles & Jars*
B. *Cans*

For editorial information, see Section 11

Aluminum Co. of America, Pittsburgh (A)
•Anchor Hocking Glass Corp., Lancaster, Ohio (A)
Basca Mfg. Co., Div. of Huyler's, Indianapolis (A)
Carbert Mfg. Co., Waltham, Mass. (A, B)
Consolidated Packaging Machinery Corp., Buffalo, N. Y. (A, B)
•Crown Cork & Seal Co., Baltimore, Md. (A, B)
Delamere & Williams Co., Ltd., Toronto, Ont. (A)
Doran Bros., Inc., Danbury, Conn. (A)
Elgin Mfg. Co., Elgin, Ill. (A, B)
Eyrle Co., San Francisco (A, B)
Kinex Co., Needham Heights, Mass. (A, B)
Metal Closures, Ltd., West Bromwich, Staffs., England (A)
•PMC, Inc., (formerly Progressive Machine Co.), Hackensack, N. J. (A)
•Pneumatic Scale Corp., Quincy, Mass. (A, B)
•Resina Automatic Machinery Co., Brooklyn, N. Y. (A, B)
•Sanford, William B., Inc., New York (A, B)
Scientific Filter Co., New York (A, B)
•Swanson, W. H., & Co., Wilmette, Ill. (A)
Tite-Cap Machine Co., New York (A, B)
Triplex Industries, Inc., Chicago (B)
•U. S. Bottlers Machinery Co., Chicago (A)
Upressit Products Corp., Danbury, Conn. (B)
White Cap Co., Chicago (A)

MACHINES, CAPSULE FILLING

For editorial information, see Section 11

•Colton, Arthur, Co., Detroit
Enu-Matic Equipment Corp., Burbank, Calif.
Pharmaceutical & Chemical Industry Supply Corp., New York
•Sanford, William B., Inc., New York
Stokes, F. J., Machine Co., Philadelphia

MACHINES, CARRIER-CARTONING

For editorial information, see Section 12

Atlanta Paper Co., Atlanta, Ga.
Container Corp. of America, Chicago
Dacam Corp., Charlotte, N. C.
Gardner Board & Carton Co., Middletown, Ohio
•Jones, R. A., & Co., Cincinnati
•Morris Paper Mills, Chicago

MACHINES, CARTON HANDLING

A. *Forming*
B. *Lining*
C. *Closing*
D. *Forming, Filling & Closing*
E. *Forming, Lining, Filling & Closing*

For editorial information, see Section 11

Acme Staple Co., Camden, N. J. (C)
Adjustomatic Packaging Machine Co., Buffalo, N. Y. (C, D)
Anderson Bros. Mfg. Co., Rockford, Ill. (D)
•Bartelt Engineering Co., Rockford, Ill. (A, D, E)
•Battle Creek Packaging Machines, Inc., Battle Creek, Mich. (A, B, C, D, E)
Bellamy, J. B., & Co., San Francisco (A, C)
•Bivans, E. L., Inc., Los Angeles (A, C)
•Bostitch, Westerly, R. I. (C)
•Clybourn Machine Corp., Chicago (D)
Codie-Kay Co., Los Angeles (A, C, D)
Constructions Industrielles de Precision, Paris, France (D)
Container Equipment Corp., Bloomfield, N. J. (A, C, D)
Dacam Corp., Charlotte, N. C. (D)
Eagle Machinery Co., San Francisco (C)
•Ferguson, J. L., Co., Joliet, Ill. (D)
Fleishhacker Paper Box Co., San Leandro, Calif. (A, C, D)
•Food Machinery & Chemical Corp., San Jose, Calif. (A, B, C, D, E)
•Geveke & Co., New York (A, B, C, D, E)
•Hesser, Fr., Maschinenfabrik A. G., Stuttgart-Bad Cannstatt, Germany (D, E)
Holmes Equipment Corp., So. San Francisco (A, C, D)
Ideal Packagings Ltd., London, England (A, C, D)
•International Paper Box Machine Co., Nashua, N. H. (A, C)
•Jones, R. A., & Co., Cincinnati (C, D)
Kliklok Corp., New York (A, B, C, D, E)
•Mercury Engineering Corp., Milwaukee (A)
•New Jersey Machine Corp., Hoboken, N. J. (A, C)
Niagara Packaging Machinery Corp., Depew, N. Y. (A, D)
•Package Machinery Co., Springfield, Mass. (A, C)
•Peters Machinery Co., Chicago (A, B, C)
•Pneumatic Scale Corp., Quincy, Mass. (A, B, C, D, E)
R E B Trays, Inc., Philadelphia (A, C, D)
•Redington, F. B., Co., Bellwood, Ill. (A, D, E)
•Sanford, William B., Inc., New York (A, C, D)
Standard Folding Trays Corp., Jackson Heights, N. Y. (A)
•Standard-Knapp, Div. Emhart Mfg. Co., Portland, Conn. (C)
Swiss Industrial Co., Neuhausen Rhine Falls, Switzerland (D, E)
Thrissell Engr. Co., Bristol, England (A)
•Triangle Package Machinery Co., Chicago (C, D)
•U. S. Automatic Box Machinery Co., Boston (A, B, C, D, E)
Waldorf Paper Products Co., St. Paul, Minn. (A, B, C, D, E)
Weigh Right Automatic Scale Co., Joliet, Ill. (C)
Wilcox Mfg. Co., Stockton, Calif. (A, C)
•Wright Machinery Co., Durham, N. C. (A, C)

MACHINES, CARTON OPENING, LOADING, CLOSING

(Cartoners)

For editorial information, see Section 11

•Bartelt Engineering Co., Rockford, Ill.
•Clybourn Machine Corp., Chicago
Codie-Kay Co., Los Angeles
Container Equipment Corp., Bloomfield, N. J.
Container Stapling Corp., Herrin, Ill.
Delamere & Williams Co., Ltd., Toronto, Ont.
•Hesser, Fr., Maschinenfabrik Aktiengesellschaft, Stuttgart-Bad Cannstatt, Germany
Ideal Packagings Ltd., London, England
•Industrie-Werke Karlsruhe, Karlsruhe, Germany
•Jones, R. A., & Co., Cincinnati
Lindstaedt Laboratories, San Anselmo, Calif.
•New Jersey Machine Corp., Hoboken, N. J.
•PMC, Inc., (formerly Progressive Machine Co.), Hackensack, N. J.
•Peters Machinery Co., Chicago
•Redington, F. B., Co., Bellwood, Ill.
•Rex Packaging Machine Co., Elizabeth, N. J.
•Stokes & Smith Co., Sub. Food Machinery & Chemical Corp., Philadelphia
•Sutherland Paper Co., Kalamazoo, Mich.
•U. S. Automatic Box Machinery Co., Boston
Waldorf Paper Products Co., St. Paul, Minn.
•Wright Machinery Co., Durham, N. C.

MACHINES, CASE HANDLING

A. *Opening*
B. *Unloading*
C. *Loading or Filling*
D. *Sealing, Glue*
E. *Sealing, Gummed Tape*
F. *Stitching*
G. *Printing*

For editorial information, see Sections 11, 12

A-B-C Packaging Machine Corp., Quincy, Ill. (B, D)
Barnes, W. F. & John, Co., Process Equipment Div., Rockford, Ill. (B, C)
•Bostitch, Westerly, R. I. (F)
Burgess Fastening Co., Cleveland (F)
Burt Machine Co., Baltimore, Md. (C)
•Chisholm-Ryder Co. of Pa., Hanover, Pa. (D)
•Clybourn Machine Corp., Chicago (D, E)
Container Handling, Inc., Los Angeles (A, B, C, D)
Diagraph-Bradley Industries, Inc., Herrin, Ill. (F, G)
Dudley Corp., Hollister, Calif. (A, B)
•Ferguson, J. L., Co., Joliet, Ill. (A, C, D, G)
Flexoveyor Mfg. Co., Denver, Colo. (B, C)
General Corrugated Machinery Co., Palisades Park, N. J. (D, E)
•Gottscho, Adolph, Inc., Hillside, N. J. (G)
•Island Equipment Corp., Long Island City, N. Y. (B)
Liquid Carbonic Corp., Chicago (B)
•National Equipment Corp., New York (D)
Paramount Mfg. Co., Stockton, Calif. (C)
Perl Machine Mfg. Co., Brooklyn, N. Y. (C)
Radio Corp. of America, Camden, N. J. (B)
•Sanford, William B., Inc., New York (C, D)
Schroeder Machines Corp., Syracuse, N. Y. (A, C, D)
Sealright Co., Fulton, N. Y. (C)
Shannon Industries, Inc., Glen Cove, N. Y. (C)
•Simplex Packaging Machinery, Inc., Oakland, Calif. (D)
•Standard-Knapp, Div. Emhart Mfg. Co., Portland, Conn. (A, B, C, D, G)
Vickers-Armstrongs Ltd., London, England (C, G)
Waldorf Paper Products Co., St. Paul, Minn. (A, C, D)

MACHINES, CELLULOSE BAND APPLYING

For editorial information, see Section 11

•Economic Machinery Co., Div. Geo. J. Meyer Mfg. Co., Worcester, Mass.
•Gisholt Machine Co., Madison, Wis.
•Hesser, Fr., Maschinenfabrik A. G., Stuttgart-Bad Cannstatt, Germany
•Industrie-Werke Karlsruhe, Karlsruhe, Germany

MACHINES, COATING

A. *General*
B. *Lacquer & Varnish*
C. *Wax & Hot Melt*

For editorial information, see Section 13

Aeroil Products Co., So. Hackensack, N. J. (C)
Applied Engineering Assoc., Brooklyn, N. Y. (A, B, C)
•Bell Machine Co., Oshkosh, Wis. (C)
•Black-Clawson Co., Dilts Machine Works Div., Fulton, N. Y. (A, B, C)
Converters Machine Co., Greenwich, Conn. (A, B, C)
Dexter Folder Co., New York (B)
Egan, Frank W., & Co., Somerville, N. J. (A, B, C)
•Haida Engineering Co., Long Island City, N. Y. (C)
Hartig Engine & Machine Co., Hillside, N. J. (C)
•Hudson-Sharp Machine Co., Green Bay, Wis. (A, C)
•Inta-Roto Machine Co., Richmond, Va. (A, B, C)
•International Paper Box Machine Co., Nashua, N. H. (C)
Jagenberg-Werke Akt.-Ges., Dusseldorf, West Germany (A, B)
•Knowlton, M. D., Co., Rochester, N. Y. (C)
•Mercury Engineering Corp., Milwaukee (A, B, C)
Moore, Kenneth J., & Co., Chicago (A, B, C)
Paper Converting Machine Co., Green Bay, Wis. (C)
•Potdevin Machine Co., Teterboro, N. J. (A, B, C)
Rutherford Machinery Co., Div. Sun Chemical Corp., Long Island City, N. Y. (A, B)
S & S Corrugated Paper Machinery Co., Brooklyn, N. Y. (C)
Schaefer Machine Co., Bridgeport, Conn. (A)
Standard Process Corp., Chicago (C)
Thrissell Engineering Co., Bristol, England (B, C)
•Waldron, John, Corp., New Brunswick, N. J. (A, B, C)

MACHINES, COLLAPSIBLE TUBE FILLING & SEALING

For editorial information, see Section 11

A & M Tool & Die Co., Southbridge, Mass.
•Arenco Machine Co., New York
Carbert Mfg. Co., Waltham, Mass.
•Colton, Arthur, Co., Detroit
Continental Can Co., Crown & Cork Div., Wilmington, Del.
•Industrie-Werke Karlsruhe, Karlsruhe, Germany
Kiefer, Karl, Machine Co., Cincinnati
Stokes, F. J., Machine Co., Philadelphia

MACHINES, COLLATING

For editorial information, see Section 12

Dexter Folder Co., New York
Harris-Seybold Co., Cleveland
•Helix Machine Co., Mineola, N. Y.
•Industrie-Werke Karlsruhe, Karlsruhe, Germany
Meisel Press Mfg. Co., Boston
Paper Converting Machine Co., Green Bay, Wis.
Scandia Mfg. Co., No. Arlington, N. J.
Verner, B., & Co., New York
•Waldron, John, Corp., New Brunswick, N. J.

MACHINES, CORKING

For editorial information, see Section 11

•Horix Mfg. Co., Pittsburgh
Metal Closures, Ltd., West Bromwich, Staffs., England
•PMC, Inc., (formerly Progressive Machine Co.), Hackensack, N. J.
Pharmaceutical & Chemical Industry Supply Corp., New York
•Pneumatic Scale Corp., Quincy, Mass.
Purdy Machinery Co., London, England
Schnier, I. F., Co., San Francisco
•U. S. Bottlers Machinery Co., Chicago

MACHINES, CORRUGATED ROLL DISPENSERS

For editorial information, see Section 13

Abana Products, Inc., Chicago
Packers' Pal, Chicago
S & S Corrugated Paper Machinery Co., Brooklyn, N. Y.

MACHINES, COTTON INSERTING

For editorial information, see Section 11

Consolidated Packaging Machinery Corp., Buffalo, N. Y.

MACHINES, COUNTING

For editorial information, see Section 11

Autotron Co., Danville, Ill.
•Colton, Arthur, Co., Detroit
Dudley Corp., Hollister, Calif.
Enu-Matic Equipment Corp., Burbank, Calif.
•Ferguson, J. L., Co., Joliet, Ill.
•Food Machinery & Chemical Corp., San Jose, Calif.
•Geveke & Co., New York
Holmes Equipment Corp., So. San Francisco
•Industrie-Werke Karlsruhe, Karlsruhe, Germany
•International Paper Box Machine Co., Nashua, N. H.
Lewis, Stephen J., Engineering Co., Brooklyn, N. Y.
Maxson Automatic Machinery Co., Westerly, R. I.
Niagara Packaging Machinery Corp., Depew, N. Y.
Pharmaceutical & Chemical Industry Supply Corp., New York
•Post Machinery Co., Beverly, Mass.
Presin Co., Los Angeles
•Redington, F. B., Co., Bellwood, Ill.

Roberts Development Corp., Hanover, Mass.
S & S Corrugated Paper Machinery Co., Brooklyn, N. Y.
•U. S. Engineering Co., Long Island City, N. Y.
Veeder-Root, Inc., Hartford, Conn.

MACHINES, CRIMPING, COLLAPSIBLE TUBE

For editorial information, see Section 11

A & M Tool & Die Co., Southbridge, Mass.
•Arenco Machine Co., New York
•Colton, Arthur, Co., Detroit
Delamere & Williams Co., Ltd., Toronto, Ont.
Perl Machine Mfg. Co., Brooklyn, N. Y.
Stokes, F. J., Machine Co., Philadelphia
Triplex Industries, Inc., Chicago

MACHINES, CRIMPING, SEAMING FIBRE CANS

For editorial information, see Section 11

American Can Co., New York
Ams, Max, Machine Co., Bridgeport, Conn.
Angelus Sanitary Can Machine Co., Los Angeles
•Knowlton, M. D., Co., Rochester, N. Y.
•Resina Automatic Machinery Co., Brooklyn, N. Y.
Tite-Cap Machine Co., New York

MACHINES, CUTTING

(Cellophane & Paper)

For editorial information, see Section 13

•Amsco Packaging Machinery, Inc., Long Island City, N. Y.
•Beck, Charles, Machine Corp., King of Prussia, Pa.
•Bell Machine Co., Oshkosh, Wis.
Craftsmen Machinery Co., Boston
Dexter Folder Co., New York
General Machinery Corp., Sheboygan, Wis.
Harris-Seybold Co., Cleveland
•Hobbs Mfg. Co., Worcester, Mass.
Jagenberg-Werke Akt.-Ges., Dusseldorf, West Germany
Meisel Press Mfg. Co., Boston
Nichols Paper Products Co., Green Bay, Wis.
Paper Converting Machine Co., Green Bay, Wis.
Roda, Fratelli, S. A., Lugano, Switzerland
Smith & Winchester Mfg. Co., So. Windham, Conn.
Standard Paper Box Machine Co., New York
Swan Machine Co., New York

MACHINES, DIE CUTTING

For editorial information, see Section 13

Abbott Plastic Machine Corp., Chicago
Altair Machinery Corp., New York
Bobst, J., & Fils, S. A., Lausanne, Switzerland
•Champlain Co., Bloomfield, N. J.
Craftsmen Machinery Co., Boston
•Hobbs Mfg. Co., Worcester, Mass.
•Mercury Engineering Corp., Milwaukee
Printing Machinery Co., Cincinnati
S & S Corrugated Paper Machinery Co., Brooklyn, N. Y.
Smith & Winchester Mfg. Co., So. Windham, Conn.
Specialty Automatic Machine Corp., Chelsea, Mass.
Swan Machine Co., New York
Thomson-National Press Co., Franklin, Mass.

MACHINES, DOMING

(Boxes)

For editorial information, see Section 13

Altair Machinery Corp., New York
•Knowlton, M. D., Co., Rochester, N. Y.
Lotz, Abbott & Co., London, England

MACHINES, EMBOSSING

For editorial information, see Section 14

Addressograph-Multigraph Corp., Cleveland
Altair Machinery Corp., New York
•Apex Machine Co., College Point, N. Y.
•Black-Clawson Co., Dilts Machine Works Div., Fulton, N. Y.
Bobst, J., & Fils, S. A., Lausanne, Switzerland
•Clark-Aiken Co., Lee, Mass.
Craftsmen Machinery Co., Boston
Dornbusch & Co., Krefeld, Germany
Egan, Frank W., & Co., Somerville, N. J.
Hope Machine Co., Philadelphia
•Hudson-Sharp Machine Co., Green Bay, Wis.
•Inta-Roto Machine Co., Richmond, Va.
Krengel Mfg. Co., New York
Lembo Machine Works, Inc., Paterson, N. J.
•Markem Machine Co., Keene, N. H.
Matthews, Jas. H., & Co., Pittsburgh
Meisel Press Mfg. Co., Boston
Modern Engraving & Machine Co., Hillside, N. J.
•Olsenmark Corp., New York
Pannier Corp., Pittsburgh
Paper Converting Machine Co., Green Bay, Wis.
•Peerless Roll Leaf Co., Union City, N. J.
•Potdevin Machine Co., Teterboro, N. J.
Rutherford Machinery Co., Div. Sun Chemical Corp., Long Island City, N. Y.
Swan Machine Co., New York
Thomson-National Press Co., Franklin, Mass.
Virkotype Corp., Plainfield, N. J.
•Waldron, John, Corp., New Brunswick, N. J.

MACHINES, ENVELOPE MAKING

For editorial information, see Section 13

Beasley, French & Co., New York
•Food Machinery & Chemical Corp., San Jose, Calif.
•Geveke & Co., New York
Goodman, Nyles, Freeport, N. Y.
Ideal Packagings, Ltd., London, England
•International Paper Box Machine Co., Nashua, N. H.
Miller Wrapping & Sealing Machine Co., Chicago
Moore, Kenneth J., & Co., Chicago
•Staude, E. G., Mfg. Co., St. Paul, Minn.

MACHINES, FIBRE CAN MAKING

For editorial information, see Section 13

Angelus Sanitary Can Machine Co., Los Angeles
•Ferguson, J. L., Co., Joliet, Ill.
•Knowlton, M. D., Co., Rochester, N. Y.

MACHINES, FILLING, DRY

(Gross & Net Weight)

For editorial information, see Section 11

•Amsco Packaging Machinery, Inc., Long Island City, N. Y.
Auto-Pack Co., Jeffersonville, Ind.
•Bell Machine Co., Oshkosh, Wis.
Brecknell, Dolman & Rogers, Ltd., Bristol, England
CPS Mfg. Co., Chicago
Chisholm-Ryder Co., Niagara Falls, N. Y.
•Coddington, E. D., Mfg. Co., Milwaukee
Codie-Kay Co., Los Angeles
Consolidated Packaging Machinery Corp., Buffalo, N. Y.
Constructions Industrielles de Precision, Paris, France
Driver, George, & Son, Ltd., Wembley, Middx., England
Eagle Machinery Co., San Francisco
Exact Weight Scale Co., Columbus, Ohio
Eyrle Co., San Francisco
•Ferguson, J. L., Co., Joliet, Ill.
•Food Machinery & Chemical Corp., San Jose, Calif.
•Frazier & Son, Clifton, N. J.
Glengarry Equipment Corp., Bay Shore, N. Y.
•Gump, B. F., Co., Chicago
Holmes Equipment Corp., So. San Francisco
Industrial Products (SPECO) Ltd., Middlesex, England
•Industrie-Werke Karlsruhe, Karlsruhe, Germany
•Karstrom, Paul L., Co., Chicago
Lindstaedt Laboratories, San Anselmo, Calif.
Little, H. C., Burner Co., San Rafael, Calif.
Mantes, T. R., Co., San Francisco
•Mercury Heat Sealing Equipment Co., Philadelphia
Miller Wrapping & Sealing Machine Co., Chicago
•Mojonnier Associates, Inc., Franklin Park, Ill.
National Instrument Co., Baltimore, Md.
Neuman, J. John, Engineering & Mfg. Co., Yorktown Heights, N. Y.
•PMC, Inc., (formerly Progressive Machine Co.), Hackensack, N. J.
•Pack-Rite Machines, Milwaukee
•Pneumatic Scale Corp., Quincy, Mass.
Richardson Scale Co., Clifton, N. J.
St. Regis Paper Co., New York
•Sanford, William B., Inc., New York
•Simplex Packaging Machinery, Inc., Oakland, Calif.
•Stokes & Smith Co., Sub. Food Machinery & Chemical Corp., Philadelphia
Thayer Scale & Engineering Corp., Rockland, Mass.
•Toledo Scale Co., Toledo, Ohio
•Trescott Co., Fairport, N. Y.
•Triangle Package Machinery Co., Chicago
•U. S. Automatic Box Machinery Co., Boston
Weigh Right Automatic Scale Co., Joliet, Ill.
Woodman Co., Decatur, Ga.
•Wright Machinery Co., Durham, N. C.

MACHINES, FILLING, DRY

(Volumetric)

For editorial information, see Section 11

•Amsco Packaging Machinery, Inc., Long Island City, N. Y.
Auto-Pack Co., Jeffersonville, Ind.
•Bartelt Engineering Co., Rockford, Ill.
•Battle Creek Packaging Machines, Inc., Battle Creek, Mich.
•Bell Machine Co., Oshkosh, Wis.
Brown Bag Filling Machine Co., Fitchburg, Mass.
CPS Mfg. Co., Chicago
Chase Equipment Corp., New York
Chisholm-Ryder Co., Niagara Falls, N. Y.
•Coddington, E. D., Mfg. Co., Milwaukee
Codie-Kay Co., Los Angeles

•Colton, Arthur, Co., Detroit
Delamere & Williams Co., Ltd., Toronto, Ont.
Elgin Mfg. Co., Elgin, Ill.
•Ferguson, J. L., Co., Joliet, Ill.
•Food Machinery & Chemical Corp., San Jose, Calif.
•Frazier & Son, Clifton, N. J.
•Hesser, Fr., Maschinenfabrik A. G., Stuttgart-Bad Cannstatt, Germany
Holmes Equipment Corp., So. San Francisco
Ideal Packagings, Ltd., London, England
•Industrie-Werke Karlsruhe, Karlsruhe, Germany
Jagenberg-Werke Akt.-Ges., Dusseldorf, West Germany
•Karstrom, Paul L., Co., Chicago
Mateer, G. Diehl, Co., Strafford, Wayne, Pa.
•Mercury Heat Sealing Equipment Co., Philadelphia
Miller Wrapping & Sealing Machine Co., Chicago
•PMC, Inc., (formerly Progressive Machine Co.), Hackensack, N. J.
Packaging Industries, Montclair, N. J.
Paramount Mfg. Co., Stockton, Calif.
Perl Machine Mfg. Co., Brooklyn, N. Y.
Pfaudler Co., Rochester, N. Y.
Plageman Enterprises, Willoughby, Ohio
•Pneumatic Scale Corp., Quincy, Mass.
•Rex Packaging Machine Co., Elizabeth, N. J.
St. Regis Paper Co., New York
•Sanford, William B., Inc., New York
•Simplex Packaging Machinery, Inc., Oakland, Calif.
•Standard-Knapp, Div. Emhart Mfg. Co., Portland, Conn.
•Stokes & Smith Co., Sub. Food Machinery & Chemical Corp., Philadelphia
Stuyvesant Engineering Co., Lyndhurst, N. J.
Thayer Scale & Engineering Corp., Rockland, Mass.
•Toledo Scale Co., Toledo, Ohio
•Triangle Package Machinery Co., Chicago
•U. S. Automatic Box Machinery Co., Boston
Waldorf Paper Products Co., St. Paul, Minn.
Weigh Right Automatic Scale Co., Joliet, Ill.

MACHINES, FILLING, LIQUID

For editorial information, see Section 11

A & M Tool & Die Co., Southbridge, Mass.
American Can Co., New York
Anderson Bros. Mfg. Co., Rockford, Ill.
Applied Engineering Assoc., Brooklyn, N. Y.
Barnes, W. F. & John, Co., Process Equipment Div., Rockford, Ill.
•Bartelt Engineering Co., Rockford, Ill.
•Biner-Ellison Machinery Co., Los Angeles
Burt, F. L., Co., San Francisco
CPS Mfg. Co., Chicago
Chase Equipment Corp., New York
Chisholm-Ryder Co., Niagara Falls, N. Y.
Codie-Kay Co., Los Angeles
•Colton, Arthur, Co., Detroit
Container Handling, Inc., Los Angeles
Cozzoli Machine Co., Plainfield, N. J.
Crandall Can Filler Machine Co., Buffalo, N. Y.
•Crown Cork & Seal Co., Baltimore, Md.
Delamere & Williams Co., Ltd., Toronto, Ont.
Drum Equipment Corp., Union, N. J.
Elgin Mfg. Co., Elgin, Ill.
Eyrle Co., San Francisco
•Food Machinery & Chemical Corp., San Jose, Calif.
•Geveke & Co., New York
Harrison, Nealis, Ltd., Hull, Yorkshire, England
Holmes Equipment Corp., So. San Francisco
Hope Machine Co., Philadelphia
•Horix Mfg. Co., Pittsburgh
Ideal Packagings, Ltd., London, England
Kiefer, Karl, Machine Co., Cincinnati
Liquid Carbonic Corp., Chicago
•MRM Co., Brooklyn, N. Y.
Mantes, T. R., Co., San Francisco
Mateer, G. Diehl, Co., Strafford, Wayne, Pa.
Metal Closures, Ltd., West Bromwich, Staffs., England
Meyer, Geo. J., Mfg. Co., Cudahy, Wis.
•Mojonnier Associates, Inc., Franklin Park, Ill.
National Instrument Co., Baltimore, Md.
National Tin Can Mfy. Co., New York
Northern Glass Co., San Francisco
•Oil Equipment Laboratories, Inc., Elizabeth, N. J.
•Packer Machinery Corp., New York
Perl Machine Mfg. Co., Brooklyn, N. Y.
Pfaudler Co., Rochester, N. Y.
Pharmaceutical & Chemical Industry Supply Corp., New York
•Pneumatic Scale Corp., Quincy, Mass.
Popper & Sons, Inc., New York
Purdy Machinery Co., London, England
•Sanford, William B., Inc., New York
Scientific Filter Co., New York
Thayer Scale & Engineering Corp., Rockland, Mass.
•Triangle Package Machinery Co., Chicago
Triplex Industries, Inc., Chicago
•U. S. Bottlers Machinery Co., Chicago

MACHINES, FILLING, NON-FREE FLOWING SOLIDS

For editorial information, see Section 11

A & M Tool & Die Co., Southbridge, Mass.
•Arenco Machine Co., New York
Barnes, W. F. & John, Co., Process Equipment Div., Rockford, Ill.
•Bartelt Engineering Co., Rockford, Ill.
•Bell Machine Co., Oshkosh, Wis.
Burt, F. L., Co., San Francisco
Chisholm-Ryder Co., Niagara Falls, N. Y.
Codie-Kay Co., Los Angeles
•Colton, Arthur, Co., Detroit
Constructions Industrielles de Precision, Paris, France
Delamere & Williams Co., Toronto, Ont.
Eagle Machinery Co., San Francisco
•Ferguson, J. L., Co., Joliet, Ill.
•Food Machinery & Chemical Corp., San Jose, Calif.
•Geveke & Co., New York
Glengarry Equipment Corp., Bay Shore, N. Y.
•Globe Co., Chicago
•Gump, B. F., Co., Chicago
Holmes Equipment Corp., So. San Francisco
Hope Machine Co., Philadelphia
•Industrie-Werke Karlsruhe, Karlsruhe, Germany
Lindstaedt Laboratories, San Anselmo, Calif.
Paramount Mfg. Co., Stockton, Calif.
Perl Machine Mfg. Co., Brooklyn, N. Y.
Plageman Enterprises, Willoughby, Ohio
•Sanford, William B., Inc., New York
•Simplex Packaging Machinery, Inc., Oakland, Calif.
Stokes, F. J., Machine Co., Philadelphia
Thayer Scale & Engineering Corp., Rockland, Mass.
•Trescott Co., Fairport, N. Y.
•Triangle Package Machinery Co., Chicago
•U. S. Automatic Box Machinery Co., Boston

MACHINES, FILLING, SEMI-LIQUID

(Viscous)

For editorial information, see Section 11

A & M Tool & Die Co., Southbridge, Mass.
Allbright-Nell Co., Chicago
•Arenco Machine Co., New York
Applied Engineering Assoc., Brooklyn, N. Y.
Barnes, W. F. & John, Co., Process Equipment Div., Rockford, Ill.
•Bartelt Engineering Co., Rockford, Ill.
•Bell Machine Co., Oshkosh, Wis.
•Biner-Ellison Machinery Co., Los Angeles
Burt, F. L., Co., San Francisco
CPS Mfg. Co., Chicago
Chisholm-Ryder Co., Niagara Falls, N. Y.
Codie-Kay Co., Los Angeles
•Colton, Arthur, Co., Detroit
Cozzoli Machine Co., Plainfield, N. J.
Crandall Can Filler Machine Co., Buffalo, N. Y.
Elgin Mfg. Co., Elgin, Ill.
Eyrle Co., San Francisco
Filler Machine Co., Philmont, Pa.
•Food Machinery & Chemical Corp., San Jose, Calif.
•Geveke & Co., New York
•Globe Co., Chicago
Harrison, Nealis, Ltd., Hull, Yorkshire, England
Holmes Equipment Corp., So. San Francisco
Hope Machine Co., Philadelphia
•Horix Mfg. Co., Pittsburgh
Ideal Packagings, Ltd., London, England
Kiefer, Karl, Machine Co., Cincinnati
•MRM Co., Brooklyn, N. Y.
Mantes, T. R., Co., San Francisco
Mateer, G. Diehl, Co., Strafford, Wayne, Pa.
•Packer Machinery Corp., New York
Perl Machine Mfg. Co., Brooklyn, N. Y.
Pfaudler Co., Rochester, N. Y.
Pharmaceutical & Chemical Supply Corp., New York
•Popper & Sons, Inc., New York
Purdy Machinery Co., London, England
•Sanford, William B., Inc., New York.
Scientific Filter Co., New York
Stokes, F. J., Machine Co., Philadelphia
Thayer Scale & Engineering Corp., Rockland, Mass.
•Triangle Package Machinery Co., Chicago
•U. S. Bottlers Machinery Co., Chicago

MACHINES, FILM EXTRUDING

For editorial information, see Section 8

•Black-Clawson Co., Dilts Machine Works Div., Fulton, N. Y.
Egan, Frank W., & Co., Somerville, N. J.
Hartig Engine & Machine Co., Hillside, N. J.
•Heinrich, H. H., Co., New York
Modern Plastic Machinery Corp., Lodi, N. J.
•National Rubber Machinery Co., Akron, Ohio
Welding Engineers, Inc., Norristown, Pa.

MACHINES, FILTER

For editorial information, see Section 11

Delamere & Williams Co., Toronto, Ont.
Dellenbarger Machine Co., New York
Eyrle Co., San Francisco
Filpaco Industries, Inc., Chicago
Kiefer, Karl, Machine Co., Cincinnati
Northern Glass Co., San Francisco
Purdy Machinery Co., London, England
Scientific Filter Co., New York

MACHINES, GLUING

For editorial information, see Section 13

A-B-C Packaging Machine Corp., Quincy, Ill.
Bobst, J., & Fils S.A., Lausanne, Switzerland
Dellenbarger Machine Co., New York
Elliot Mfg. Co., Fresno, Calif.
Evrle Co., San Francisco
•Ferguson, J. L., Co., Joliet, Ill.
•Fry, George H., Co., Mineola, N. Y.
General Corrugated Machinery Co., Palisades Park, N. J.
Globe Mfg. Co., Philadelphia
Gluetools, Inc., Indianapolis
Harris-Seybold Co., Cleveland
High Production Machine Co., Div. E. G. Staude Mfg. Co., St. Paul, Minn.
•International Paper Box Machine Co., Nashua, N. H.
Jagenberg-Werke Akt.-Ges., Dusseldorf, West Germany
Moore, Kenneth J., & Co., Chicago
•National Equipment Corp., New York
Niagara Packaging Machinery Corp., Depew, N. Y.
•Post Machinery Co., Beverly, Mass.
•Potdevin Machine Co., Teterboro, N. J.
•Rex Packaging Machine Co., Elizabeth, N. J.
S & S Corrugated Paper Machinery Co., Brooklyn, N. Y.
Schaefer Machine Co., Bridgeport, Conn.
Smith & Winchester Mfg. Co., So. Windham, Conn.
Specialty Automatic Machine Corp., Chelsea, Mass.
•Standard-Knapp, Div. Emhart Mfg. Co., Portland, Conn.
Standard Paper Box Machine Co., New York
•Staude, E. G., Mfg. Co., St. Paul, Minn.
•Stokes & Smith Co., Sub. Food Machinery & Chemical Corp., Philadelphia
Thrissell Engineering Co., Bristol, England
Weigh Right Automatic Scale Co., Joliet, Ill.

MACHINES, HEAT SEALING

(Complete & Separate Units)

A. *Band Type*
B. *Belt Type*
C. *Electronic*
D. *Jaw Type*
E. *Rotary Type*

(See also Heat Sealers)

For editorial information, see Section 11

A & M Tool & Die Co., Southbridge, Mass. (D, E)
•Amsco Packaging Machinery, Inc., Long Island City, N. Y. (B, C, D, E)
•Bell Machine Co., Oshkosh, Wis. (C, E)
CPS Mfg. Co., Chicago (D, E)
Callahan, J. A., Co., Chicago (C)
•Cargo Packers Special Products Co., Brooklyn, N. Y. (C)
Chaffee, Ralph, & Co., San Francisco (A)
Codie-Kay Co., Los Angeles (D, E)
Delamere & Williams Co., Ltd., Toronto, Ont. (E)
Dexter Folder Co., New York (B)
•Doughboy Industries, Inc., New Richmond, Wis. (A, E)
Dumatic Industries, Philadelphia (C, D)
Electronic Processes Corp., Los Altos, Calif. (C, D, E)
•Fry, George H., Co., Mineola, N. Y. (B)
•Globe Heat-Seal, Inc., Los Angeles (D)
Griswold & Co., Montreal, Que. (D)
Holmes Equipment Corp., So. San Francisco (E)
•Horix Mfg. Co., Pittsburgh (C)
Ideal Packagings, Ltd., London, England (A, B, C, D, E)
Induction Heating Corp., Brooklyn, N. Y. (C)
Joa, Curt G., Inc., Sheboygan Falls, Wis. (C)
Kabar Mfg. Corp., New York (C)
•Karstrom, Paul L., Co., Chicago (A, B, D)
Little, H. C., Burner Co., San Rafael, Calif. (B)
M & R Mfg. Co., Mansfield, Ohio (D)
•MRM Co., Brooklyn, N. Y. (E)
Mason & Foster, Midland, Mich. (B)
Mayflower Electronic Devices, Inc., West New York, N. J. (B, C, D, E)
•Mercury Heat Sealing Equipment Co., Philadelphia (D)
Miller-Robinson Co., Los Angeles (A, C)
Miller Wrapping & Sealing Machine Co., Chicago (C, D, E)
New Jersey Electronic Co., Passaic, N. J. (C)
Packaging Industries, Montclair, N. J. (A, D)
•Pack-Rite Machines, Milwaukee (D, E)
•Peters Machinery Co., Chicago (D)
Pharmaceutical & Chemical Industry Supply Corp., New York (D)
•Product Packaging Engineering, Culver City, Calif. (D)
•Queen Transparent Specialties, Chicago (D)
Radio Receptor Co., Thermatron Div., New York (C)
•Richter, Frederic, A., Chicago (C)
•Sanford, William B., Inc., New York (A, B, E)
Scandia Mfg. Co., No. Arlington, N. J. (E)
Seward Industries, Inc., New York (C)
•Simplex Packaging Machinery, Inc., Oakland, Calif. (C, D, E)
Singer Sewing Machine Co., New York (C)
•Vertrod Corp., Brooklyn, N. Y. (D)
Wincanton Transport & Engineering Co., Sherborne, England (D)
Woodman Co., Decatur, Ga. (B, E,)
•Wrap-Ade Machine Co., Belleville, N. J. (D)

MACHINES, HOODING

For editorial information, see Section 11

Basca Mfg. Co., Div. of Huyler's, Indianapolis
•Package Machinery Co., Springfield, Mass.

MACHINES, INJECTION MOLDING

For editorial information, see Sections 8, 13

De Mattía Machine & Tool Co., Clifton, N. J.
Fellows Gear Shaper Co., Springfield, Vt.
Harvey, Guy P., & Son Corp., Leominster, Mass.
Hydraulic Press Mfg. Co., Mount Gilead, Ohio
Improved Machinery, Inc., Nashua, N. H.
Lester Engineering Co., Cleveland
Lewis Welding & Engineering Corp., Bedford, Ohio
Moslo Machinery Co., Cleveland
Reed-Prentice Corp., Worcester, Mass.
Standard Tool Co., Leominster, Mass.
Stokes, F. J., Machine Co., Philadelphia
Van Dorn Iron Works Co., Cleveland
Watson-Stillman Co., Div. H. K. Porter Co., Roselle, N. J.

MACHINES, LABEL DISPENSING

For editorial information, see Section 11

Archer Label Co., Los Angeles
Better Packages, Inc., Shelton, Conn.
Delamere & Williams Co., Toronto, Ont.
Derby Sealers, Inc., Derby, Conn.
Dumatic Industries, Philadelphia
•Ever Ready Label Corp., Belleville, N. J.
Fairbairn Tape & Label Co., San Francisco
Hummel, A. C., Co., Cincinnati
Kimball, A., Co., New York
•Kleen-Stik Products, Inc., Chicago
Kwik Lok Corp., Yakima, Wash.
Lawson & Jones, Ltd., London, Ont.
Nelson Label Machine Corp., Newark, N. J.
Niagara Packaging Machinery Corp., Depew, N. Y.
•Oliver Machinery Co., Grand Rapids, Mich.
Schaefer Machine Co., Bridgeport, Conn.

MACHINES, LABEL GUMMING

For editorial information, see Section 11

Delamere & Williams Co., Toronto, Ont.
Diagraph-Bradley Industries, Inc., Herrin, Ill.
Jagenberg-Werke Akt.-Ges., Dusseldorf, West Germany
•Potdevin Machine Co., Teterboro, N. J.
Purdy Machinery Co., London, England
Schaefer Machine Co., Bridgeport, Conn.
Scientific Filter Co., New York
•Stokes & Smith Co., Sub. Food Machinery & Chemical Corp., Philadelphia

MACHINES, LABELING

For editorial information, see Section 11

•Amsco Packaging Machinery, Inc., Long Island City, N. Y.
Bellamy, J. B., & Co., San Francisco
•Biner-Ellison Machinery Co., Los Angeles
•Chisholm-Ryder Co. of Pa., Hanover, Pa.
•Doughboy Industries, Inc., New Richmond, Wis.
Dumatic Industries, Philadelphia
•Economic Machinery Co., Div. Geo. J. Meyer Mfg. Co., Worcester, Mass.
•Ever Ready Label Corp., Belleville, N. J.
•Haida Engineering Co., Long Island City, N. Y.
•Hayssen Mfg. Co., Sheboygan, Wis.
Jagenberg-Werke Akt.-Ges., Dusseldorf, West Germany
Kimball, A., Co., New York
•Lakso Co., Fitchburg, Mass.
Liquid Carbonic Corp., Chicago
•MRM Co., Brooklyn, N. Y.
•Mercury Heat Sealing Equipment Co., Philadelphia
Metal Closures, Ltd., West Bromwich, Staffs., England
Moore, Kenneth J., & Co., Chicago
•National Equipment Corp., New York
Nelson Label Machine Corp., Newark, N. J.
•New Jersey Machine Corp., Hoboken, N. J.
Niagara Packaging Machinery Corp., Depew, N. Y.
•Oliver Machinery Co., Grand Rapids, Mich.
Pharmaceutical & Chemical Industry Supply Corp., New York
•Pneumatic Scale Corp., Quincy, Mass.
•Potdevin Machine Co., Teterboro, N. J.
Purdy Machinery Co., London, England
•Sanford, William B., Inc., New York
Scientific Filter Co., New York
•Standard-Knapp, Div. Emhart Mfg. Co., Portland, Conn.
•Stokes & Smith Co., Sub. Food Machinery & Chemical Corp., Philadelphia
Weber Label & Marking Systems, Div. Weber Addressing Machine Co., Mount Prospect, Ill.
Woodman Co., Decatur, Ga.
Wrap-King Corp., Holyoke, Mass.

MACHINES, LABELING ATTACHMENTS

For editorial information, see Section 11

•Amsco Packaging Machinery, Inc., Long Island City, N. Y.
•Chisholm Ryder Co. of Pa., Hanover, Pa.
Dumatic Industries, Philadelphia
•Economic Machinery Co., Div. Geo. J. Meyer Mfg. Co., Worcester, Mass.
•Hayssen Mfg. Co., Sheboygan, Wis.
Krengel Mfg. Co., New York
•MRM Co., Brooklyn, N. Y.
Miller Wrapping & Sealing Machine Co., Chicago
Niagara Packaging Machinery Corp., Depew, N. Y.
•Oliver Machinery Co., Grand Rapids, Mich.
•Peters Machinery Co., Chicago
Purdy Machinery Co., London, England
Scandia Mfg. Co., Arlington, N. J.
•Simplex Packaging Machinery, Inc., Oakland, Calif.
Wrap-King Corp., Holyoke, Mass.

MACHINES, LAMINATING

For editorial information, see Section 13

•Black-Clawson Co., Dilts Machine Works Div., Fulton, N. Y.
Converters Machine Co., Greenwich, Conn.
Dornbusch & Co., Krefeld, Germany
Egan, Frank W., & Co., Somerville, N. J.
•Haida Engineering Co., Long Island City, N. Y.
Hartig Engine & Machine Co., Hillside, N. J.
•Hudson-Sharp Machine Co., Green Bay, Wis.
Hydraulic Press Mfg. Co., Mount Gilead, Ohio
•Inta-Roto Machine Co., Richmond, Va.
Jagenberg-Werke Akt.-Ges., Dusseldorf, West Germany
Lembo Machine Works, Inc., Paterson, N. J.
•Mercury Engineering Corp., Milwaukee
Moore, Kenneth H., & Co., Chicago
Paper Converting Machine Co., Green Bay, Wis.
•Potdevin Machine Co., Teterboro, N. J.
Protexall Permanent Process Service, Kansas City, Mo.
Specialty Automatic Machine Corp., Chelsea, Mass.
Thrissel Engineering Co., Bristol, England
Virginia Laminating Co., Amelia, Va.
•Waldron, John, Corp., New Brunswick, N. J.

MACHINES, MARKING

(Box & Carton)

For editorial information, see Section 12

Addressograph-Multigraph Corp., Cleveland
Algene Marking Equipment Co., Garfield, N. J.
•Apex Machine Co., College Point, N. Y.
Atlas Stamp Co., Youngstown, Ohio
Elliot Mfg. Co., Fresno, Calif.
•Ferguson, J. L., Co., Joliet, Ill.
Force, Wm. A., & Co., Brooklyn, N. Y.
•Gottscho, Adolph, Inc., Hillside, N. J.
•Industrial Marking Equipment Co., Brooklyn, N. Y.
Kimball, A., Co., New York
Kliklok Corp., New York
Krengel Mfg. Co., New York
•Markem Machine Co., Keene, N. H.
Matthews, Jas. H., & Co., Pittsburgh
Multistamp Co., Norfolk, Va.
National Rubber Stamp Works, New York
Pannier Corp., Pittsburgh
Pierce Wrapping Machine Co., La Grange Park, Ill.
•Popper & Sons, Inc., New York
•Post Machinery Co., Beverly, Mass.
•Rex Packaging Machine Co., Elizabeth, N. J.
Verner, B., & Co., New York
Weber Label & Marking Systems, Div. Weber Addressing Machine Co., Mount Prospect, Ill.

MACHINES, METAL EDGE STAYING

For editorial information, see Section 13

National Metal Edge Box Co., Philadelphia

MACHINES, MOUNTING & PROVING

A. *Rotogravure*
B. *Rubber Printing Plates*

For editorial information, see Sections 13, 14

Harley Co., Brooklyn, N. Y. (B)
•Inta-Roto Machine Co., Richmond, Va. (A)
•Mosstype Corp., Brooklyn, N. Y. (B)
Motter's, George F., Sons, York, Pa. (A, B)
Pannier Corp., Pittsburgh (B)
Roto-Type Corp., Woodside, N. Y. (B)
Swan Machine Co., New York (A)
Williamson & Co., Caldwell, N. J. (B)

MACHINES, NUMBERING, PRINTING OR PERFORATING

For editorial information, see Section 12

Acro Tool & Die Works, Chicago
Addressograph-Multigraph Corp., Cleveland
American Perforator Co., Chicago
American Tag Co., Belleville, N. J.
Bates Mfg. Co., Orange, N. J.
•Champlain Co., Bloomfield, N. J.
•Ferguson, J. L., Co., Joliet, Ill.
Force, Wm. A., & Co., Brooklyn, N. Y.
Frostad Engineering Co., Milwaukee
•Gottscho, Adolph, Inc., Hillside, N. J.
Halley Rotopress Corp., Chicago
Harris-Seybold Co., Cleveland
Ideal Packaging, Ltd., London, England
•Industrial Marking Equipment Co., Brooklyn, N. Y.
Industrial Tape Printers, Div. Industrial Equipment & Supply, Wernersville, Pa.
Kliklok Corp., New York
•Manhasset Machine Co., Mineola, N. Y.
•Markem Machine Co., Keene, N. H.
Matthews, Jas. H., & Co., Pittsburgh
Meisel Press Mfg. Co., Boston
Multistamp Co., Norfolk, Va.
National Rubber Stamp Works, New York
•New Jersey Machine Corp., Hoboken, N. J.
•Olsenmark Corp., New York
Paper Converting Machine Co., Green Bay, Wis.
•Paper Machinery & Research, Inc., Roselle, N. J.
Pharmaceutical & Chemical Industry Supply Corp., New York
Pitney-Bowes, Inc., Stamford, Conn.
•Rex Packaging Machine Co., Elizabeth, N. J.
Rutherford Machinery Co., Div. Sun Chemical Corp., Long Island City, N. Y.
Scandia Mfg. Co., No. Arlington, N. J.
•Standard-Knapp, Div. Emhart Mfg. Co., Portland, Conn.
Swan Machine Co., New York
Van Leer's Vatenfabrieken N.V., Amsterdam, Holland
Verner, B., & Co., New York

MACHINES, PAPER BOTTLE MAKING

For editorial information, see Section 13

•Champlain Co., Bloomfield, N. J.
•Mercury Engineering Corp., Milwaukee
•Staude, E. G., Mfg. Co., St. Paul, Minn.

MACHINES, PAPER ROLL FEEDING

For editorial information, see Section 12

•Black-Clawson Co., Dilts Machine Works Div., Fulton, N. Y.
•Clark-Aiken Co., Lee, Mass.
Egan, Frank W., & Co., Somerville, N. J.
Johnstone Engineering & Machine Co., Parkersburg, Pa.
•Mercury Engineering Corp., Milwaukee
Paper Converting Machine Co., Green Bay, Wis.
•Rosenthal Mfg. Co., Chicago
S & S Corrugated Paper Machinery Co., Brooklyn, N. Y.
•Waldron, John, Corp., New Brunswick, N. J.

MACHINES, PAPER SHREDDING

For editorial information, see Section 18

Industrial Shredder & Cutter Co., Salem, Ohio
Jeffrey Mfg. Co., Columbus, Ohio
Shredmaster Corp., Brooklyn, N. Y.
Swan Machine Co., New York

MACHINES, PARTITION ASSEMBLING

For editorial information, see Section 13

•Inman Mfg. Co., Amsterdam, N. Y.
Kliklok Corp., New York
Mayhew, J. H., Co., Excelsior, Mich.
S & S Corrugated Paper Machinery Co., Brooklyn, N. Y.

MACHINES, PARTITION SLOTTING

(Corrugated & Chip Board)

For editorial information, see Section 13

High Production Machine Co., Div. E. G. Staude Mfg. Co., St. Paul, Minn.
Hooper, F. X., Co., Glenarm, Md.
•Inman Mfg. Co., Amsterdam, N. Y.
S & S Corrugated Paper Machinery Co., Brooklyn, N. Y.
•Staude, E. G., Mfg. Co., St. Paul, Minn.
Thrissel Engineering Co., Bristol, England

MACHINES, REVENUE STAMP APPLYING

For editorial information, see Section 11

•Arenco Machine Co., New York
Purdy Machinery Co., London, England
Scandia Mfg. Co., No. Arlington, N. J.
•Wright Machinery Co., Durham, N. C.

MACHINES, RIGID TRANSPARENT FABRICATING

For editorial information, see Section 13

American Tool Works Co., Cincinnati
Borkland Laboratories, Marion, Ind.
Goodman, Nyles, Freeport, N. Y.
High Production Machine Co., Div. E. G. Staude Mfg. Co., St. Paul, Minn.
•Taber Instrument Corp., No. Tonawanda, N. Y.

MACHINES, ROLL LEAF STAMPING

For editorial information, see Section 14

•Apex Machine Co., College Point, N. Y.
Altair Machinery Corp., New York
Coe, W. H., Mfg. Co., New York
Coughlin Mfg. Co., New York
Craftsmen Machinery Co., Boston
•Hesser, Fr., Maschinenfabrik A.G., Stuttgart-Bad Cannstatt, Germany
•Industrial Marking Equipment Co., Brooklyn, N. Y.
•Markem Machine Co., Keene, N. H.
•Olsenmark Corp., New York
Pannier Corp., Pittsburgh
•Peerless Roll Leaf Co., Union City, N. J.
Swan Machine Co., New York
Swift, M., & Sons, Inc., Hartford, Conn.
Woehr, F. A., Machine Co., Rochester, N. Y.

MACHINES, SCORING

For editorial information, see Section 13

Ams, Max, Machine Co., Bridgeport, Conn.
Bobst, J., & Fils S.A., Lausanne, Switzerland
•Colt's Mfg. Co., Hartford, Conn.
Dellenbarger Machine Co., New York
•Knowlton, M. D., Co., Rochester, N. Y.
•Mercury Engineering Corp., Milwaukee
S & S Corrugated Paper Machinery Co., Brooklyn, N. Y.
Standard Paper Box Machine Co., New York
Vickers-Armstrongs Ltd., London, England

MACHINES, SHEET FEEDING

For editorial information, see Section 13

•Clark-Aiken Co., Lee, Mass.
Dellenbarger Machine Co., New York
Dexter Folder Co., New York
General Corrugated Machinery Co., Palisades Park, N. J.
Holmes Equipment Corp., So. San Francisco
Lindstaedt Laboratories, San Anselmo, Calif.
•New Jersey Machine Corp., Hoboken, N. J.
S & S Corrugated Paper Machinery Co., Brooklyn, N. Y.
Verner, B., & Co., New York

MACHINES, SHEETING

For editorial information, see Section 13

•Amsco Packaging Machinery, Inc., Long Island City, N. Y.
Beasley, French & Co., New York
•Beck, Charles, Machine Corp., King of Prussia, Pa.
•Black-Clawson Co., Dilts Machine Works Div., Fulton, N. Y.
•Champlain Co., Bloomfield, N. J.
•Clark-Aiken Co., Lee, Mass.
Cobden Chadwick Ltd., Oldham, Lancs., England
Converters Machine Co., Greenwich, Conn.
Derby Scalers, Inc., Derby, Conn.
Globe Mfg. Co., Philadelphia
Goodman, Nyles, Freeport, N. Y.
Halley Rotopress Corp., Chicago
Henschel, C. B., Mfg. Co., Milwaukee
•Hobbs Mfg. Co., Worcester, Mass.
•Hudson-Sharp Machine Co., Green Bay, Wis.
Jagenberg-Werke Akt.-Ges., Dusseldorf, West Germany
Miller Wrapping & Sealing Machine Co., Chicago
Modern Plastic Machinery Corp., Lodi, N. J.
•National Rubber Machinery Co., Akron, Ohio
Paper Converting Machine Co., Green Bay, Wis.
•Peters Machinery Co., Chicago
S & S Corrugated Paper Machinery Co., Brooklyn, N. Y.
•Simplex Packaging Machinery, Inc., Oakland, Calif.
Van Leer's Vatenfabrieken N.V., Amsterdam, Holland
Weber, H. G., & Co., Kiel, Wis.
•Wolverine Paper Converting Machinery Corp., Detroit

MACHINES, SLITTERS & REWINDERS

For editorial information, see Section 13

Ams, Max, Machine Co., Bridgeport, Conn.
Bagprint Machinery Corp., Sub. Valley Iron Works, Appleton, Wis.
Beasley, French & Co., New York
•Beck, Charles, Machine Corp., King of Prussia, Pa.
•Black-Clawson Co., Dilts Machine Works Div., Fulton, N. Y.
Bliss, E. W., Co., Canton, Ohio
Bobst, J., & Fils S.A., Lausanne, Switzerland
Cameron Machine Co., Brooklyn, N. Y.
Converters Machine Co., Greenwich, Conn.
Cottrell Co., Sub. Harris-Seybold Co., Westerly, R. I.
•Dusenberry, John, Co., Verona, N. J.
Guide Co., Canfield, Ohio
•Hobbs Mfg. Co., Worcester, Mass.
•Hudson-Sharp Machine Co., Green Bay, Wis.
•Industrial Tape Printers, Div. Industrial Equipment & Supply Co., Wernersville, Pa.
•Inta-Roto Machine Co., Richmond, Va.
Jagenberg-Werke Akt.-Ges., Dusseldorf, West Germany
Johnstone Engineering & Machine Co., Parkersburg, Pa.
•Kidder Press Co., Dover, N. H.
Knowlton, M. D., Co., Rochester, N. Y.
Langston, Samuel M., Co., Camden, N. J.
•Manhasset Machine Co., Mineola, N. Y.
Meisel Press Mfg. Co., Boston
Paper Converting Machine Co., Green Bay, Wis.
S & S Corrugated Paper Machinery Co., Brooklyn, N. Y.
Swan Machine Co., New York
Thrissell Engineering Co., Bristol, England
•Waldron, John, Corp., New Brunswick, N. J.
•Wolverine Paper Converting Machinery Corp., Detroit

MACHINES, SPECIAL, DESIGNERS & BUILDERS OF

For editorial information, see Sections 11, 12

A & M Tool & Die Co., Southbridge, Mass.
•Apex Machine Co., College Point, N. Y.
Barkley & Dexter, Inc., Fitchburg, Mass.
Barnes, W. F. & John, Co., Process Equipment Div., Rockford, Ill.
•Black-Clawson Co., Dilts Machine Works Div., Fulton, N. Y.
Carbert Mfg. Co., Waltham, Mass.
Central Design & Development Co., Brooklyn, N. Y.
•Clark-Aiken Co., Lee, Mass.
•Clybourn Machine Corp., Chicago
Codie-Kay Co., Los Angeles
Dellenbarger Machine Co., New York
•Dependable Compressor & Machine Co., New York
Designers for Industry, Inc., Cleveland
Egan, Frank W., & Co., Somerville, N. J.
•Ferguson, J. L., Co., Joliet, Ill.
Ferguson Machine & Tool Co., St. Louis, Mo.
•Food Machinery & Chemical Corp., San Jose, Calif.
Goodman, Nyles, Freeport, N. Y.
Griswold & Co., Montreal, Que.
•Haida Engineering Co., Long Island City, N. Y.
•Helix Machine Co., Mineola, N. Y.
Holmes Equipment Corp., So. San Francisco
Hooper, F. X., Co., Glenarm, Md.
•Hudson-Sharp Machine Co., Green Bay, Wis.
Ideal Packagings, Ltd., London, England
•Inta-Roto Machine Co., Richmond, Va.
Landis, Ellis M., Philadelphia
Lindstaedt Laboratories, San Anselmo, Calif.
Maine Machine Works, Los Angeles
Maxson Automatic Machinery Co., Westerly, R. I.
Meisel Press Mfg. Co., Boston
•Mercury Engineering Corp., Milwaukee
•Mojonnier Associates, Inc., Franklin Park, Ill.
Motter's, George F., Sons, York, Pa.
Niagara Packaging Machinery Corp., Depew, N. Y.
•PMC, Inc., (formerly Progressive Machine Co.), Hackensack, N. J.
•Package Machinery Co., Springfield, Mass.
Packaging Engineering Co., North Hollywood, Calif.
Paper Converting Machine Co., Green Bay, Wis.
•Peters Machinery Co., Chicago
Plageman Enterprises, Willoughby, Ohio
•Potdevin Machine Co., Teterboro, N. J.
•Redington, F. B., Co., Bellwood, Ill.
•Rex Packaging Machine Co., Elizabeth, N. J.
•Richter, Frederic A., Chicago
Roberts Development Corp., Hanover, Mass.
Scandia Mfg. Co., No. Arlington, N. J.
Shannon Industries, Inc., Glen Cove, N. Y.
Smith & Winchester Mfg. Co., So. Windham, Conn.
Specialty Automatic Machine Corp., Chelsea, Mass.
Taft-Peirce Mfg. Co., Woonsocket, R. I.
Triplex Industries, Inc., Chicago
Van Buren Wrapping Machine Corp., Brooklyn, N. Y.

MACHINES, SPIRAL WRAPPING

For editorial information, see Section 11

Pierce Wrapping Machine Co., La Grange Park, Ill.
Terkelsen Machine Co., Boston

MACHINES, SPOUT INSERTING

For editorial information, see Section 13

Seal-Spout Corp., Newark, N. J.
Van Leer's Vatenfabrieken N.V., Amsterdam, Holland

MACHINES, STACKING

For editorial information, see Sections 11, 12

•Food Machinery & Chemical Corp., San Jose, Calif.
General Corrugated Machinery Co., Palisades Park, N. J.
Horne, E. C., Machinery Co., Denver, Colo.
Joa, Curt G., Inc., Sheboygan Falls, Wis.
Lewis-Shepard Products, Inc., Watertown, Mass.
Maxson Automatic Machinery Co., Westerly, R. I.
Niagara Packaging Machinery Corp., Depew, N. Y.
•Peters Machinery Co., Chicago

MACHINES, STAPLING

For editorial information, see Section 12

Acme Staple Co., Camden, N. J.
•Acme Steel Co., Chicago
American Machine Works, Inc., Racine, Wis.
Arrow Fastener Co., Brooklyn, N. Y.
Bates Mfg. Co., Orange, N. J.
•Bostitch, Westerly, R. I.
Burgess Fastening Co., Cleveland
Container Stapling Corp., Herrin, Ill.
Dexter Folder Co., New York
Fastener Corp., Chicago
General Staple Co., New York
Harris-Seybold Co., Cleveland
Heller Co., Cleveland
Ideal Stitcher Co., Div. W. R. Pabich Mfg. Co., Chicago
•Inland Wire Products Co., Chicago
•International Staple & Machine Co., Herrin, Ill.
Lotz, Abbott & Co., London, England
Neva-Clog Products, Inc., Bridgeport, Conn.
Pabich, W. R., Mfg. Co., Chicago
Precision Staple Corp., Sarasota, Fla.
Speed Products Co., Long Island City, N. Y.
Staplex Co., Brooklyn, N. Y.

MACHINES, STEEL RULE DIEMAKING

For editorial information, see Sections 13, 14

Craftsmen Machinery Co., Boston
Helmold, J. F., & Bro., Inc., Chicago
•Mercury Engineering Corp., Milwaukee
•Richards, J. A., Co., Kalamazoo, Mich.

MACHINES, TABLET COUNTING & PACKAGING

For editorial information, see Section 11

•Bartelt Engineering Co., Rockford, Ill.
•Colton, Arthur, Co., Detroit
Cozzoli Machine Co., Plainfield, N. J.
Enu-Matic Equipment Corp., Burbank, Calif.
•Geveke & Co., New York
Holmes Equipment Corp., So. San Francisco
Hope Machine Co., Philadelphia
•Hudson-Sharp Machine Co., Green Bay, Wis.
Ideal Packagings, Ltd., London, England
•Industrie-Werke Karlsruhe, Karlsruhe, Germany
•Karstrom, Paul L., Co., Chicago
•Lakso Co., Fitchburg, Mass.
•Mercury Heat Sealing Equipment Co., Philadelphia
Pharmaceutical & Chemical Industry Supply Corp., New York
•Popper & Sons, Inc., New York
•Redington, F. B., Co., Bellwood, Ill.
•Sanford, William B., Inc., New York
•Stokes & Smith Co., Sub. Food Machinery & Chemical Corp., Philadelphia
•U. S. Automatic Box Machinery Co., Boston
•U. S. Engineering Co., Long Island City, N. Y.

MACHINES, TABLET FORMING

For editorial information, see Section 11

Brecknell, Dolman & Rogers, Ltd., Bristol, England
•Colton, Arthur, Co., Detroit
Pharmaceutical & Chemical Industry Supply Corp., New York
Stokes, F. J., Machine Co., Philadelphia

MACHINES, TAPE APPLYING

A. *Gummed*
B. *Heat Sealing*
C. *Pressure-Sensitive*
D. *Tear Strip*

For editorial information, see Sections 11, 12

Cleveland Lathe & Machine Co., Cleveland (C)
•Colt's Mfg. Co., Hartford, Conn. (A)
Dellenbarger Machine Co., New York (A, C)
•Ever Ready Label Corp., Belleville, N. J. (A, C)
General Corrugated Machinery Co., Palisades Park, N. J. (A, C, D)
•Geveke & Co., New York (D)
•Globe Heat-Seal, Inc., Los Angeles (B)
Guide Co., Canfield, Ohio (C)
Hummel, A. C., Co., Cincinnati (A, D)
•Industrie-Werke Karlsruhe, Karlsruhe, Germany (A, B)
•Kleen-Stik Products, Inc., Chicago (C)
Minnesota Mining & Mfg. Co., St. Paul, Minn. (C, D)
Niagara Packaging Machinery Corp., Depew, N. Y. (C)
•Oliver Machinery Co., Grand Rapids, Mich. (B)
•Pack-Rite Machines, Milwaukee (A)
Permacel Tape Corp., New Brunswick, N. J. (C)
Roll-On Sealer Co., Antioch, Ill. (A)
Scandia Mfg. Co., No. Arlington, N. J. (A, B, C, D)
Van Buren Wrapping Machine Corp., Brooklyn, N. Y. (D)
Wagner Iron Works, Milwaukee (A,B,C,D)
Weber, H. G., & Co., Kiel, Wis. (C, D)
Wincanton Transport & Engineering Co., Sherborne, England (C)
Winne, Frank W., & Son, Philadelphia (C, D)

MACHINES, TAPE DISPENSERS

A. *Gummed*
B. *Pressure-Sensitive*
C. *Printing Attachment*

For editorial information, see Section 12

Better Packages, Inc., Shelton, Conn. (A, B, C)
Chippewa Paper Products Co., Chicago (A, B)
Cleveland Lathe & Machine Co., Cleveland (B)
Derby Sealers, Inc., Derby, Conn. (A, B, C)
Diagraph-Bradley Industries, Inc., Herrin, Ill. (A)
•Ever Ready Label Corp., Belleville, N. J. (A, B, C)
Fairbairn Tape & Label Co., San Francisco (A, B, C)
Frostad Engineering Co., Milwaukee (A, C)
Guide Co., Canfield, Ohio (B)
Gummed Tape & Devices Co., Brooklyn, N. Y. (A, B, C)
Hummel, A. C., Co., Cincinnati (A, C)
•Industrial Marking Equipment Co., Brooklyn, N. Y. (C)
Industrial Tape Printers, Div. Industrial Equipment & Supply Co., Wernersville, Pa. (B)
Kimball, A., Co., New York (A, B)
Krengel Mfg. Co., New York (C)
Lawson & Jones Ltd., London, Ont. (A, B)
Marsh Stencil Machine Co., Belleville, Ill. (A)
Nashua Corp., Nashua, N. H. (A)
•Paper Machinery & Research, Inc., Roselle, N. J. (A, B)
Permacel Tape Corp., New Brunswick, N. J. (A, B)
Roll-On Sealer Co., Antioch, Ill. (A)
Tripp Tape, Inc., Melrose Park, Ill. (A)
Weber, H. G., & Co., Kiel, Wis. (B)
Winne, Frank W., & Son, Philadelphia (B, C)

MACHINES, TEA BAG

For editorial information, see Section 11

Automatic Scale Co., New York
•Bartelt Engineering Co., Rockford, Ill.
•Bell Machine Co., Oshkosh, Wis.
Delamere & Williams Co., Toronto, Ont.
•Hesser, Fr., Maschinenfabrik A.G. Stuttgart-Bad Cannstatt, Germany
Holmes Equipment Corp., So. San Francisco
•Industrie-Werke Karlsruhe, Karlsruhe, Germany
•Pneumatic Scale Corp., Quincy, Mass.
•Sanford, William B., Inc., New York
•Stokes & Smith Co., Sub. Food Machinery & Chemical Corp., Philadelphia
•Teepak Spezialmaschinen G. M. B. H., Dusseldorf, Germany

MACHINES, TIGHT WRAPPING

(For Carton Shells)

For editorial information, see Section 11

Constructions Industrielles de Precision, Paris, France
•Hayssen Mfg. Co., Sheboygan, Wis.
•Hudson-Sharp Machine Co., Green Bay, Wis.
•Pneumatic Scale Corp., Quincy, Mass.
•Sanford, William B., Inc., New York
Scandia Mfg. Co., No. Arlington, N. J.
•Stokes & Smith Co., Sub. Food Machinery & Chemical Corp., Philadelphia

MACHINES, TUBE LACQUERING, VARNISHING & PRINTING

For editorial information, see Section 13

•Apex Machine Co., College Point, N. Y.
Rutherford Machinery Co., Div. Sun Chemical Corp., Long Island City, N. Y.

MACHINES, TUBE WINDING

A. *Convolute*
B. *Spiral*

For editorial information, see Section 13

•Black-Clawson Co., Dilts Machine Works Div., Fulton, N. Y. (A)
Jagenberg-Werke Akt.-Ges., Dusseldorf, West Germany (A)
•Knowlton, M. D., Co., Rochester, N. Y. (A, B)
Landis, Ellis M., Philadelphia (B)
Paper Converting Machine Co., Green Bay, Wis. (B)

MACHINES, TYING

For editorial information, see Sections 12, 18

Bunn, B. H., Co., Chicago
Felins Tying Machine Co., Milwaukee
Gerrard Steel Strapping Div., United States Steel Corp., Chicago
•Inland Wire Products Co., Chicago
•Karstrom, Paul L., Co., Chicago
Mid-States Steel & Wire Co., Crawfordsville, Ind.
Producers Exchange, Inc., Toledo, Ohio
Renois Tying Machines, Inc., Melrose Park, Ill.
Tipper Tie, Inc., Union, N. J.

MACHINES, TYPESETTING & LETTERING

For editorial information, see Section 14

•Filmotype Corp., Chicago
•Olsenmark Corp., New York
Varigraph Co., Madison, Wis.

MACHINES, UNIT PACKAGING

(Forming, Filling & Sealing)

For editorial information, see Section 11

•Bartelt Engineering Co., Rockford, Ill.
•Battle Creek Packaging Machines, Inc., Battle Creek, Mich.
•Bell Machine Co., Oshkosh, Wis.
Brecknell, Dolman & Rodgers, Ltd., Bristol, England
CPS Mfg. Co., Chicago
•Clybourn Machine Corp., Chicago
Codie-Kay Co., Los Angeles
Constructions Industrielles de Precision, Paris, France
Delamere & Williams Co., Toronto, Ont.
•Ferguson, J. L., Co., Joliet, Ill.
General Packaging Equipment Co., Houston, Texas
•Geveke & Co., New York
•Hayssen Mfg. Co., Sheboygan, Wis.
•Hesser, Fr., Maschinenfabrik A.G., Stuttgart-Bad Cannstatt, Germany
Holmes Equipment Corp., S. San Francisco
Ideal Packagings, Ltd., London, England
•Industrie-Werke Karlsruhe, Karlsruhe, Germany
•Ivers-Lee Co., Newark, N. J.
•Karstrom, Paul L., Co., Chicago
Mason-Keller Corp., Roseland, N. J.
•Mercury Heat Sealing Equipment Co., Philadelphia
PNR Corp., Cleveland
•Package Machinery Co., Springfield, Mass.
•Pneumatic Scale Corp., Quincy, Mass.
•Product Packaging Engineering, Culver City, Calif.
•Redington, F. B., Co., Bellwood, Ill.
•Rex Packaging Machine Co., Elizabeth, N. J.
Roto Wrap Machine Corp., Englewood, N. J.
•Sanford, William B., Inc., New York
•Stokes & Smith Co., Sub. Food Machinery & Chemical Corp., Philadelphia
Swiss Industrial Co., Neuhausen Rhine Falls, Switzerland
Triplex Industries, Inc., Chicago
•Wrap-Ade Machine Co., Belleville, N. J.

MACHINES, UNSCRAMBLING

For editorial information, see Section 11

A-B-C Packaging Machine Corp., Quincy, Ill.
Barnes, W. F. & John, Co., Process Equipment Div., Rockford, Ill.
•Biner-Ellison Machinery Co., Los Angeles
•Chisholm Ryder Co. of Pa., Hanover, Pa.
Codie-Kay Co., Los Angeles
Dudley Corp., Hollister, Calif.
Eyrle Co., San Francisco
Filler Machine Co., Philmont, Pa.
•Horix Mfg. Co., Pittsburgh
•Industrie-Werke Karlsruhe, Karlsruhe, Germany
•Island Equipment Corp., Long Island City, N. Y.
Liquid Carbonic Corp., Chicago
M-H Standard Co., Jersey City, N. J.
•Mojonnier Associates, Inc., Franklin Park, Ill.
Roberts Development Corp., Hanover, Mass.
•Sanford, William B., Inc., New York
•Standard-Knapp, Div. Emhart Mfg. Co., Portland, Conn.

MACHINES, VACUUM FORMING

(For Plastic Sheet)

For editorial information, see Section 13

Abbott Plastic Machine Corp., Chicago
Auto-Vac Co., Bridgeport, Conn.
Borkland Laboratories, Marion, Ind.
•Cargo Packers Special Products Co., Brooklyn, N. Y.
•Comet Industries, Franklin Park, Ill.
•Dewey & Almy Chemical Co., Div. W. R. Grace & Co., Cambridge, Mass.
Formvac Corp., Div. Welding Engineers, Inc., New York
Reed-Prentice Corp., Worcester, Mass.
Somerset Industrial Designs, Somerville, N. J.
Vacuum Forming Corp., Port Washington, N. Y.
Zack Industries, Passaic, N. J.

MACHINES, VACUUM & GAS PACKING

A. *Flexible Packages*
B. *Rigid Packages*

For editorial information, see Section 11

•Anchor Hocking Glass Corp., Lancaster, Ohio (B)
•Bartelt Engineering Co., Rockford, Ill. (A)
Delamere & Williams Co., Ltd., Toronto, Ont. (B)
•Dewey & Almy Chemical Co., Div. W. R. Grace & Co., Cambridge, Mass. (A)
•Hudson-Sharp Machine Co., Green Bay, Wis. (A, B)
Ideal Packagings, Ltd., London, England (A)
Johnson, Gordon, Co., Kansas City, Mo. (A)
•Oil Equipment Laboratories, Inc., Elizabeth, N. J. (B)
•Package Machinery Co., Springfield, Mass. (A)
•Standard Packaging Corp., Flex-Vac Div., New York (A)

MACHINES, VIBRATORS

(For Packing & Settling)

For editorial information, see Section 11

CPS Mfg. Co., Chicago
Cleveland Vibrator Co., Cleveland
Constructions Industrielles de Precision, Paris, France
Driver, George, & Son Ltd., Wembley, Middx., England
Eyrle Co., San Francisco
•Fry, George H., Co., Mineola, N. Y.
•Gump, B. F., Co., Chicago
Horne, E. C., Machinery Co., Denver, Colo.
Neuman, J. John, Engineering & Mfg. Co., Yorktown Heights, N. Y.
Syntron Co., Homer City, Pa.

MACHINES, WIRE STITCHING

For editorial information, see Section 12

Acme Steel Co., Chicago
American Machine Works, Inc., Racine, Wis.
•Bostitch, Westerly, R. I.
Burgess Fastening Co., Cleveland
Container Stapling Corp., Herrin, Ill.
Diagraph-Bradley Industries, Inc., Herrin, Ill.
General Staple Co., New York
Heller Co., Cleveland
Ideal Stitcher Co., Div. W. R. Pabich Mfg. Co., Chicago
•Inland Wire Products Co., Chicago
Mid-States Steel & Wire Co., Crawfordsville, Ind.
Pabich, W. R., Mfg. Co., Chicago
Standard Paper Box Machine Co., New York

MACHINES, WRAPPING

For editorial information, see Section 11

American Machine & Foundry Co., New York
•Amsco Packaging Machinery, Inc., Long Island City, N. Y.
•Angier Corp., Framingham, Mass.
•Battle Creek Packaging Machines, Inc., Battle Creek, Mich.
Bodolay, Stephen, Inc., Springfield, Mass.
Dellenbarger Machine Co., New York
Dumatic Industries, Philadelphia
Ebert Electronics Corp., Queens Village, N. Y.
General Machinery Corp., Sheboygan, Wis.
•Geveke & Co., New York
•Globe Co., Chicago
Guide Co., Canfield, Ohio
•Hayssen Mfg. Co., Sheboygan, Wis.
•Helix Machine Co., Mineola, N. Y.
•Hesser, Fr., Maschinenfabrik A. G., Stuttgart-Bad Cannstatt, Germany
High Production Machine Co., Div. E. G. Staude Mfg. Co., St. Paul, Minn.
•Hudson-Sharp Machine Co., Green Bay, Wis.
Ideal Packagings Ltd., London, England
•Industrie-Werke Karlsruhe, Karlsruhe, Germany
Joa, Curt G., Inc., Sheboygan Falls, Wis.
•Lynch Corp., Anderson, Ind.
Maine Machine Works, Los Angeles
Metal Closures Ltd., West Bromwich, Staffs., England
Miller Wrapping & Sealing Machine Co., Chicago
•National Equipment Corp., New York
•Oliver Machinery Co., Grand Rapids, Mich.
•Package Machinery Co., Springfield, Mass.
Pierce Wrapping Machine Co., La Grange Park, Ill.
•Product Packaging Engineering, Culver City, Calif.
Rathbun & Bird Co., New York
•Redington, F. B., Co., Bellwood, Ill.
Roberts Development Corp., Hanover, Mass.
•Rosenthal Mfg. Co., Chicago
Scandia Mfg. Co., No. Arlington, N. J.
Schooler Mfg. Co., Burbank, Calif.
•Simplex Packaging Machinery, Inc., Oakland, Calif.
Standard Paper Box Machine Co., New York
•Stokes & Smith Co., Sub. Food Machinery & Chemical Corp., Philadelphia
Supermatic Packaging Corp., Newark, N. J.
Swiss Industrial Co., Neuhausen Rhine Falls, Switzerland
Terkelsen Machine Co., Boston.
Van Buren Wrapping Machine Corp., Brooklyn, N. Y.
White, R. G., Mfg. Corp., Ozone Park, N. Y.
Wrap-King Corp., Holyoke, Mass.
•Wright Machinery Co., Durham, N. C.

MARKING EQUIPMENT

For editorial information, see Section 12

Abana Products, Inc., Chicago
Acro Tool & Die Works, Chicago
•Apex Machine Co., College Point, N. Y.
•Dennison Mfg. Co., Framingham, Mass.
•Dependable Compressor & Machine Co., New York
•Ferguson, J. L., Co., Joliet, Ill.
Force, Wm. A., & Co., Brooklyn, N. Y.

•Gottscho, Adolph, Inc., Hillside, N. J.
Ideal Packagings Ltd., London, England
•Industrial Marking Equipment Co., Brooklyn, N. Y.
Kimball, A., Co., New York
Krengel Mfg. Co., New York
Kwik Lok Corp., Yakima, Wash.
Marsh Stencil Machine Co., Belleville, Ill.
Matthews, Jas. H., & Co., Pittsburgh
Maxson Automatic Machinery Co., Westerly, R. I.
Multistamp Co., Norfolk, Va.
National Rubber Stamp Works, New York
•Olsenmark Corp., New York
Packers' Pal, Chicago
Pannier Corp., Pittsburgh
•Popper & Sons, Inc., New York
Scandia Mfg. Co., No. Arlington, N. J.
Superior Marking Equipment Co., Chicago
Time Saving Specialties, Minneapolis

METAL DETECTORS

For editorial information, see Section 12

Allis-Chalmers Mfg. Co., Milwaukee
Brilmayer, E. W., Laboratories, New York
Cesco (Columbia Engineering Service Co.), Santa Rosa, Calif.
Dudley Corp., Hollister, Calif.
Radio Corp. of America, Camden, N. J.

PACKAGE IMPRINTING DEVICES

(See Machines, Marking, Box & Carton; Machines, Numbering, Printing or Perforating; Machines, Roll Leaf Stamping)

PALLETIZING EQUIPMENT

(See Equipment, Materials Handling)

PERFORATORS

(See Machines, Numbering, Printing or Perforating)

PLATES, RUBBER PRINTING

For editorial information, see Section 12

Addressograph-Multigraph Corp., Cleveland
•Apex Machine Co., College Point, N. Y.
Diagraph-Bradley Industries, Inc., Herrin, Ill.
•Industrial Marking Equipment Co., Brooklyn, N. Y.
Krengel Mfg. Co., New York
Matthews, Jas. H., & Co., Pittsburgh
•Mosstype Corp., Brooklyn, N. Y.
Pannier Corp., Pittsburgh
•Rau Rubber Engraving Co., Hackensack, N. J.
Roto-Type Corp., Woodside, N. Y.
Swan Machine Co., New York
Wilsolite Corp., Buffalo, N. Y.

PRESSES, PRINTING

A. *Flexographic*
B. *Letterpress*
C. *Lithographic*
D. *Rotogravure*

For editorial information, see Section 14

•American Type Founders, Inc., Elizabeth, N. J. (B, C, D)
Beasley, French & Co., New York (A, B)
•Black-Clawson Co., Dilts Machine Works Div., Fulton, N. Y. (A)
•Champlain Co., Bloomfield, N. J. (A, B, D)
Cobden Chadwick, Ltd., Oldham, Lancs., England (C)
Converters Machine Co., Greenwich, Conn. (A, D)
Cottrell Co., Sub. Harris-Seybold Co., Westerly, R. I. (B, D)
Egan, Frank W., & Co., Somerville, N. J. (D)
Ferguson Machine & Tool Co., St. Louis, Mo. (B)
Frostad Engineering Co., Milwaukee (A, B)
Geveke & Co., New York (B, C, D)
•Haida Engineering Co., Long Island City, N. Y. (A)
Halley Rotopress Corp., Chicago (A, B, D)
Harley Co., Brooklyn, N. Y. (A)
Harris-Seybold Co., Cleveland (B, C, D)
•Heinrich, H. H., Co., New York (A)
•Helix Machine Co., Mineola, N. Y. (A, D)
Hess & Barker, Philadelphia (A, B)
•Hesser, Fr., Maschinenfabrik Aktiengesellschaft, Stuttgart-Bad Cannstatt, Germany (D)
Hooper, F. X., Co., Glenarm, Md. (B)
•Hudson-Sharp Machine Co., Green Bay, Wis. (A, B, C, D)
•Inta-Roto Machine Co., Richmond, Va. (A, D)
•International Paper Box Machine Co., Nashua, N. H. (B, C)
•Kidder Press Co., Dover, N. H. (A, B, D)
Lembo Machine Works, Inc., Paterson, N. J. (A, D)
Levey, Fred'k H., Co., New York (C)
•Manhasset Machine Co., Mineola, N. Y. (A, B, C, D)
Markandy, Inc., Kirkwood, Mo. (A)
•Mercury Engineering Corp., Milwaukee (A, D)
Miller Printing Machinery Co., Pittsburgh (B)
Motter's, George F., Sons, York, Pa. (A, B, C, D)
•New Era Mfg. Co., Paterson, N. J. (B)
•Olsenmark Corp., New York (B)
Paper Converting Machine Co., Green Bay, Wis. (A, B)
•Paper Machinery & Research, Inc., Roselle, N. J. (A)
•Potdevin Machine Co., Teterboro, N. J. (A, B)
San Mateo Development Co., San Jose, Calif. (A)
Shannon, Alexander J., Co., New York (A, D)
Specialty Automatic Machine Corp., Chelsea, Mass. (A, B)
Standard Process Corp., Chicago (D)
•Staude E. G., Mfg. Co., St. Paul, Minn. (B, D)
Swan Machine Co., New York (D)
Thrissell Engineering Co., Bristol, England (D)
•Waldron, John, Corp., New Brunswick, N. J. (A, C, D)
Weber, H. G., & Co., Kiel, Wis. (A, D)
•Wolverine Paper Converting Machinery Corp., Detroit (A)

PRESSES, PRINTING & BLANKING

(Cutting, Creasing, Stripping)

For editorial information, see Sections 13, 14

Ams, Max, Machine Co., Bridgeport, Conn.
•Baldwin-Lima-Hamilton Corp., Hamilton, Ohio
Bobst, J., & Fils S.A., Lausanne, Switzerland
•Champlain Co., Bloomfield, N. J.
Cottrell Co., Sub. Harris-Seybold Co., Westerly, R. I.
Craftsmen Machinery Co., Boston
Frostad Engineering Co., Milwaukee
Harris-Seybold Co., Cleveland
•Hesser, Fr., Maschinenfabrik Aktiengesellschaft, Stuttgart-Bad Cannstatt, Germany
•Hobbs Mfg. Co., Worcester, Mass.
Hooper, F. X., Co., Glenarm, Md.
•Manhasset Machine Co., Mineola, N. Y.
•Mercury Engineering Corp., Milwaukee
Miller Printing Machinery Co., Pittsburgh
•New Era Mfg. Co., Paterson, N. J.
•Olsenmark Corp., New York
S & S Corrugated Paper Machinery Co., Brooklyn, N. Y.
Specialty Automatic Machine Corp., Chelsea, Mass.
Thomson-National Press Co., Franklin, Mass.
Thrissell Engineering Co., Bristol, England

PRINTING EQUIPMENT

A. *Cylinders*
B. *Engraving Equipment*
C. *Extension Deliveries*
D. *Plates*
E. *Silk Screen*
F. *Tape Printers*

For editorial information, see Section 14

•Acme Gravure Services, Inc., Chicago (A)
Addressograph-Multigraph Corp., Cleveland (D)
•American Type Founders, Inc., Elizabeth, N. J. (A, B)
•Clark-Aiken Co., Lee, Mass. (A)
Cottrell Co., Sub. Harris-Seybold Co., Westerly, R. I. (A, C)
Decorating Process, Inc., Div. Fuld Bros., Inc., Baltimore, Md. (E)
Dellenbarger Machine Co., New York (C)
•Dependable Compressor & Machine Co., New York (E)
Ferguson Machine & Tool Co., St. Louis, Mo. (B)
Frostad Engineering Co., Milwaukee (A)
Harris-Seybold Co., Cleveland (D)
•Helix Machine Co., Mineola, N. Y. (A)
Hess & Barker, Philadelphia (A)
•Hudson-Sharp Machine Co., Green Bay, Wis. (A, B)
•Inta-Roto Machine Co., Richmond, Va. (A)
•Intaglio Service Corp., New York (A)
Lembo Machine Works, Inc., Paterson, N. J. (A, B)
Levey, Fred'k. H., Co., New York (D)
•Mercury Engineering Corp., Milwaukee (A)
Miller Printing Machinery Co., Pittsburgh (A)
•Mosstype Corp., Brooklyn, N. Y. (A, D)
Motter's, George F., Sons, York, Pa. (A, B, C)
•Paper Machinery & Research, Inc., Roselle, N. J. (A)
Pierce Wrapping Machine Co., La Grange Park, Ill. (B)
Printing Machinery Co., Cincinnati (A)
Rathbun & Bird Co., New York (C)
•Rau Rubber Engraving Co., Hackensack, N. J.
Rotogravure Engineering Corp., Louisville, Ky. (A)
S & S Corrugated Paper Machinery Co., Brooklyn, N. Y. (C)
San Mateo Development Co., San Jose, Calif. (F)
Standard Process Corp., Chicago (A, B)
Vitra-Tone Engraving Corp., Brooklyn, N. Y. (A)

PUMPS, AIR

(See Equipment, Air Pumps)

ROLLERS, EMBOSSING

For editorial information, see Section 14

Dornbusch & Co., Krefeld, Germany
•Hudson-Sharp Machine Co., Green Bay, Wis.
Lembo Machine Works, Inc., Paterson, N. J.
Matthews, Jas. H., & Co., Pittsburgh
Paper Converting Machine Co., Green Bay, Wis.
•Paper Machinery & Research, Inc., Roselle, N. J.
Pierce Wrapping Machine Co., La Grange Park, Ill.
Shannon, Alexander J., Co., New York
Swan Machine Co., New York
Vitra-Tone Engraving Corp., Brooklyn, N. Y.
•Waldron, John, Corp., New Brunswick, N. J.

ROLLERS, PRINTING

For editorial information, see Section 14

Algene Marking Equipment Co., Garfield, N. J.
•American Type Founders, Inc., Elizabeth, N. J.
•Helix Machine Co., Mineola, N. Y.
Lembo Machine Works, Inc., Paterson, N. J.
•Manhasset Machine Co., Mineola, N. Y.
•Paper Machinery & Research, Inc., Roselle, N. J.
U. S. Rubber Co., New York
Vitra-Tone Engraving Corp., Brooklyn, N. Y.

ROLLERS, RUBBER DESIGN

For editorial information, see Section 14

Matthews, Jas. H., & Co., Pittsburgh
•Mosstype Corp., Brooklyn, N. Y.
Rotogravure Engineering Corp., Louisville, Ky.

SCALES

A. *Automatic Check Weighers*
B. *Conveyor*
C. *Freight, Express (Computing)*
D. *Over & Under Weight*

For editorial information, see Sections 11, 12

•Bartelt Engineering Co., Rockford, Ill. (A)
Bellamy, J. B., & Co., San Francisco (A)
Brecknell, Dolman & Rogers, Ltd., Bristol, England (A)
Codie-Kay Co., Los Angeles (A)
Detecto Scales, Inc., Brooklyn, N. Y. (A, B, C, D)
Driver, George, & Son Ltd., Wembley, Middx., England (A)
Exact Weight Scale Co., Columbus, Ohio (A, B, D)
Hi-Speed Checkweigher Co., Ithaca, N. Y. (A, D)
Howe Scale Co., Rutland, Vt. (A, B, C, D)
Industrial Products (SPECO) Ltd., Middlesex, England (A)
Jeffrey Mfg. Co., Columbus, Ohio (A, B)
Producers Exchange, Toledo, Ohio (A, D)
Richardson Scale Co., Clifton, N. J. (B)
Scale Specialties & Systems, Inc., Roseland, N. J. (D)
Thayer Scale & Engineering Corp., Rockland, Mass. (A, B, D)
•Toledo Scale Co., Toledo, Ohio (A, B, C, D)
Torsion Balance Co., Clifton, N. J. (A, D)
•Trescott Co., Fairport, N. Y. (A, D)
•Wright Machinery Co., Durham, N. C. (A)

SCALES, WEIGHING & FILLING

(See also Machines, Filling, Dry, Gross & Net Weight; Machines, Filling, Dry, Volumetric)

For editorial information, see Section 11

•Amsco Packaging Machinery, Inc., Long Island City, N. Y.
Automatic Scale Co., New York
Auto-Pack Co., Jeffersonville, Ind.
Codie-Kay Co., Los Angeles
Consolidated Packaging Machinery Corp., Buffalo, N. Y.
Constructions Industrielles de Precision, Paris, France
Detecto Scales, Inc., Brooklyn, N. Y.
Driver, George, & Son Ltd., Wembley, Middx., England
Eagle Machinery Co., San Francisco
Exact Weight Scale Co., Columbus, Ohio
•Gump, B. F., Co., Chicago
•Hesser, Fr., Maschinenfabrik A. G., Stuttgart-Bad Cannstatt, Germany
Holmes Equipment Corp., S. San Francisco
Howe Scale Co., Rutland, Vt.
Industrial Products (SPECO) Ltd., Middlesex, England
Lindstaedt Laboratories, San Anselmo, Calif.
Little, H. C., Burner Co., San Rafael, Calif.
•Mercury Heat Sealing Equipment Co., Philadelphia
•Pneumatic Scale Corp., Quincy, Mass.
Richardson Scale Co., Clifton, N. J.
•Sanford, William B., Inc., New York
•Stokes & Smith Co., Sub. Food Machinery & Chemical Corp., Philadelphia
Thayer Scale & Engineering Corp., Rockland, Mass.
•Toledo Scale Co., Toledo, Ohio
Torsion Balance Co., Clifton, N. J.
•Trescott Co., Fairport, N. Y.
•Triangle Package Machinery Co., Chicago
Tri-Pak Machinery Service, Inc., Harlingen, Texas
•U. S. Automatic Box Machinery Co., Boston
Weigh Right Automatic Scale Co., Joliet, Ill.
Woodman Co., Decatur, Ga.
•Wright Machinery Co., Durham, N. C.

STENCIL-MAKING EQUIPMENT

For editorial information, see Section 12

Diagraph-Bradley Industries, Herrin, Ill.
Marsh Stencil Machine Co., Bellville, Ill.
Matthews, Jas. H., & Co., Pittsburgh
Multistamp Co., Norfolk, Va.
Pannier Corp., Pittsburgh

TANKS, HEATING & DIPPING

For editorial information, see Section 12

Aeroil Products Co., So. Hackensack, N. J.
Applied Engineering Assoc., Brooklyn, N. Y.
•Bell Machine Co., Oshkosh, Wis.
Cooper, D. C., Chicago
Filpaco Industries, Inc., Chicago
Johnson, Gordon, Co., Kansas City, Mo.
M-H Standard Co., Jersey City, N. J.
Sta-Warm Electric Co., Ravenna, Ohio
Sure-Seal Corp., Salt Lake City, Utah
•Vulcan Electric Co., Danvers, Mass.

TESTING EQUIPMENT

For editorial information, see Sections 2, 18

American Instrument Co., Silver Spring, Md.
Atmosphere Control Co., Philadelphia
•Baldwin-Lima-Hamilton Corp., Hamilton, Ohio
•Cady, E. J., & Co., River Forest, Ill.
Cambridge Instrument Co., New York
Drum Equipment Corp., Union, N. J.
Hart Moisture Gauges, Inc., New York
Impact-O-Graph Corp., Cleveland
Korn, Henry P., New York
L. A. B. Corp., Skaneateles, N. Y.
Minden Paper Gauge Co., New York
National Forge & Ordnance Co., Irvine, Pa.
Olsen, Tinius, Testing Machine Co., Willow Grove, Pa.
Package Materials Laboratories, Inc., Hatboro, Pa.
Perkins, B. F., & Sons, Holyoke, Mass.
Photovolt Corp., New York
•Taber Instrument Corp., No. Tonawanda, N. Y.
Testing Machines, Inc., New York
Thwing-Albert Instrument Co., Philadelphia
Torsion Balance Co., Clifton, N. J.

DISTRIBUTORS, JOBBERS AND SALES AGENTS

Abana Products, Inc., Chicago
Adams, Theo., Chicago
Allied Commodities Co., Minneapolis
Atlas Stamp Co., Youngstown, Ohio
Austin Industries, Inc., Marlboro, Mass.
Bowley, Peter D., & Assoc., San Francisco
Bracamonte, R. M., & Co., San Francisco
Bunn Packaging Machinery Co., Chicago
Conapac Machine Co., New York
Cornelius, Theodore, Machinery, New York
Craftsmen Machinery Co., Boston
Duncan Equipment Co., Seattle, Wash.
Eastern Duo-Fast Corp., New York
Eastern Packaging Equipment Corp., Long Island City, N. Y.
Elliot Mfg. Co., Fresno, Calif.
Filpaco Industries, Inc., Chicago
Gibbs-Brower Co., New York
Globe Mfg. Co., Philadelphia
Griswold & Co., Montreal, Que.
Halsell Brokerage Co., Denver, Colo.
Hofmann, Alfred, & Co., West New York, N. J.
Hornney & Co., New York
Jacobwitz, Charles S., Corp., Buffalo, N. Y.
Jewett, A. S., Machinery, New York
Keeny, J. R., Co., Louisville, Ky.
King, Charles E., & Co., Chicago
L & M Sales Co., Chicago
Larson Packaging Equipment Co., St. Louis, Mo.
Lengsfield Bros., Inc., New Orleans, La.
Loeb Equipment Supply Co., Chicago
Lotz, Abbott & Co., London, England
Lyttleton, Don, Packaging Machinery, Houston, Texas
Mailler Searles, Inc., San Francisco
Mantes, T. R., Co., San Francisco
McCambridge Packaging Equipment Co., Chicago
Miller Wrapping & Sealing Machine Co., Chicago
Minnesota Filler Co., Minneapolis
Packageers Co., Chicago
Peerless Confectionery Equipment Co., New York
Peters, Ralph E., Co., San Francisco
Phillips Assoc., Oakland, Calif.
Royce, Stark & Co., Milwaukee
Shannon Industries, Inc., Glen Cove, N. Y.
Spec-Fab Co., Philadelphia
Stiles Conveyors & Transmissions, Miami, Fla.
Stokes Equipment Co., Philadelphia
Stylecraft Packaging Service, Inc., Charlotte, N. C.
Thor Mac, Inc., Chicago
Todt, Fred, & Co., Los Angeles
Triangle Container Corp., Chicago
Tri-Pak Machinery Service, Inc., Harlingen, Texas
Van Sweringen, Charles F., Hackensack, N. J.
West Coast Plastics Distributors, Inc., Culver City, Calif.

Services Section

ASSOCIATIONS, TRADE & EDUCATIONAL

(Pertaining to Packaging)

For editorial information, see Section 2

Adhesives Manufacturers Assn. of America, New York
Advertising Federation of America, New York
Advertising Research Foundation, New York
Air Transport Assn. of America, Washington, D. C.
Aluminum Assn., New York
American Chemical Society, Washington, D. C.
American Management Assn., New York
American Pulp & Paper Superintendents Assn., Chicago
American Rack Merchandisers Institute, Chicago
American Society for Testing Materials, Philadelphia
American Standards Assn., Inc., New York
American Veneer Package Assn., Orlando, Fla.
Associated Cooperage Industries of America, Inc., St. Louis, Mo.
Association of American Railroads, Freight Claim Div., Chicago
Can Manufacturers Institute, Washington, D. C., New York
Canning Machinery & Supplies Assn., Washington, D. C.
Chemical Specialties Manufacturers Assn., Inc., New York
Coated & Processed Paper Assn., Providence, R. I.
Collapsible Tube Manufacturers Assn., New York
Color Research Institute of America, Chicago
Eastern Wooden Box Assn., Boston
Envelope Manufacturers Assn. of America, New York
Fibre Box Assn., Chicago
Fibre Drum Manufacturers Assn., New York
Folding Paper Box Assn. of America, Chicago; New York
Glass Container Manufacturers Institute, New York
Glassine & Greaseproof Manufacturers Assn., New York
Gummed Industries Assn., Inc., New York
Industrial Bag & Cover Assn., New York
Industrial Mineral Fiber Institute, New York
Institute of Food Technologists, Geneva, N. Y.
Institute of Paper Chemistry, Appleton, Wis.
Kraft Paper Assn., Inc., New York
Label Manufacturers National Assn., Washington, D. C.
Laminated Foil Manufacturers Assn., Providence, R. I.
Lead Industries Assn., New York
Liquid Tight Paper Container Assn., New York
Lithographers National Assn., New York
Lithographic Technical Foundation, New York
Manufacturing Chemists Assn., Inc., Washington, D. C.
Marking Device Assn., Evanston, Ill.
National Assn. of Display Industries, Chicago
National Assn. of Glue Manufacturers, Inc., New York
National Assn. of Printing Ink Makers, New York
National Assn. of Sanitary Milk Bottle Closure Manufacturers, Philadelphia
National Barrel & Drum Assn., Washington, D. C.
National Canners Assn., Washington, D. C.
National Confectioners Assn., Chicago
National Fibre Can & Tube Assn., New York
National Flexible Packaging Assn., Cleveland
National Food Distributors Assn., Chicago
National Meat Canners Assn., Chicago
National Paint, Varnish & Lacquer Assn., Washington, D. C.
National Paper Box Manufacturers Assn., Philadelphia
National Paperboard Assn., Chicago
National Wholesale Druggists Assn., New York
National Wooden Box Assn., Washington, D. C.
National Wooden Pallet Manufacturers Assn., Washington, D. C.
Package Designers Council, New York
Packaging Institute, Inc., New York
Packaging Machinery Manufacturers Institute, Inc., New York
Paper Bag Manufacturers Institute, New York
Paper Cup & Container Institute, New York
Paper Pail Assn., Chicago
Paper Shipping Sack Manufacturers Assn., New York
Paraffined Carton Research Council, Chicago
Plastic Products Mfrs. Assn., New York
Point-of-Purchase Advertising Institute, New York
Proprietary Assn., Washington, D. C.
Seal & Label Institute, New York
Society of Industrial Packaging & Materials Handling Engineers, Chicago
Society of the Plastics Industry, Inc., New York
Solid Fibre Box Corp., Washington, D. C.
Southern Box & Crate Assn., Shreveport, La.
Steel Shipping Container Institute, Inc., New York
Sulphite Paper Manufacturers Assn., New York
Technical Assn. Pulp & Paper Industry, New York
Textile Bag Manufacturers Assn., Evanston, Ill.
Textile Color Card Assn. of U. S., New York
Tri-State Packers' Assn., Inc., Easton, Md.
United States Trademark Assn., New York
Vegetable Parchment Manufacturers Assn., New York
Waterproof Paper Manufacturers Assn., New York
Waxed Paper Institute, Inc., Chicago
Weatherproof Fibre Box Group, Washington, D. C.
Wirebound Box Manufacturers Assn., Inc., Chicago
Wooden Box Institute, San Francisco

CONTRACT PACKAGING

A. *Dry Products*
B. *Liquid Products*
C. *Pressure-Packed (aerosols)*
D. *Packing & Crating*
E. *Hand Operations*

For editorial information, see Section 2

ALABAMA

Ames Bag Co., Selma (A, D, E)

CALIFORNIA

Bishop, William, Co., Burbank (A, B, E)
Coast Custom Filling Co., Los Angeles (A, B, E)
Holmes Equipment Corp., So. San Francisco (A, B, E)
Hurwich, R., Co., Berkeley (A, B, E)
Par-Way Custom Packaging, South Gate (A, B, E)
•Product Packaging Engineering, Culver City (A, E)
Specification Packaging Engineering Corp., Burbank (A, D, E)
Steven, William, Co., Los Angeles (A, B)
Western Filling Corp., Los Angeles (C)

CONNECTICUT

Bridgeport Brass Co., Bridgeport (C)
Connecticut Chemical Research Corp., Bridgeport (C)
Powr-Pak, Inc., Bridgeport (C)
Taylor-Reed Corp., Glenbrook (A, B)

FLORIDA

Averil of Florida, Inc., Miami (A, B, E)

ILLINOIS

Acme Packaging Service, Chicago (A, B)
Advance Packaging Co., Chicago (A, B, D, E)
•Arvey Corp., Chicago (A, B, D, E)
Aeropak, Inc., Chicago (C)
Brewer & Kriet, Chicago (A, B, E)
•Capitol Packaging Co., Forest Park (B, C, E)
•Cenpro Corp., Northfield (A, B)
Chemi-Form Corp., Chicago (B, C, E)
Continental Filling Corp., Danville (B, C)
Fil-O-Matic Corp., Chicago (B)
Kolar Laboratories, Inc., Chicago (B, E)
Lake-River Terminals, Inc., Argo (B)
•Mojonnier Assoc., Franklin Park (C)
•Packaging Service Corp., Chicago (A, B, D, E)
•Paket, Inc., Chicago (A, B, D, E)
Ringwood Chemical Corp., Ringwood (A, B, D, E)
Rose, Gene, Co., Chicago (C)

INDIANA

Auto-Pack Co., Jeffersonville (A, D, E)
Perfection Packaging, Shelburn (A, B, E)

KANSAS

Penn-Central Oil Co., Kansas City (B)

MARYLAND

Fuld Bros., Inc., Baltimore (A, B, C, E)
Stalfort, John C., & Sons, Inc., Baltimore (B, C, D, E)

MASSACHUSETTS

Advance Coatings Co., Westminster (B)
Armstrong Laboratory, W. Roxbury (B C)
Austin Industries, Inc., Marlboro (A, B, E)
•Bradley Container Corp., Maynard (A, B)
Puritan Distributing Co., Aerosol Filling Div., Boston (B, C)
Thayer, Henry, Co., Cambridge (A, B, E)
Tubed Chemicals Corp., Easthampton (A, B, E)
Unit-Packet Co., Wilmington (A, B)

MICHIGAN

American Aerosol Corp., Holland (C)
Liquifoil Corp., Alma (B)

MINNESOTA

Sta-Vis Oil Co., St. Paul (B)

MISSOURI

Douglas Chemical Co., No. Kansas City (A, B, E)
Interstate Chemical Products Co., Kansas City (A, B, E)

NEW JERSEY

Custom Packaging, Inc., Newark (A, B, E)
•Dumont Enterprises, Inc., Englewood (A)
Fischer-Wehmann Corp., West New York (A, E)
Fluid Chemical Co., Newark (A, B, C, D, E)
General Packaging Service, Inc., So. Hackensack (A, E)
•Ivers-Lee Co., Newark (A, B, E)
Karp Co., Jersey City (A, D, E)
Mason-Keller Corp., Roseland (A, B)
Newark Paper Box Co., Newark (D, E)
Old Empire, Inc., Newark (A, B, C, D, E)
Pack-It, Newark (A, B, E)
Petroleum Solvents Corp., Newark (B)
Private Brands, Inc., Clifton (A, B, E)

NEW YORK

ADF Packaging Service, Suffern (A, B, D, E)
Aacon Contracting Co., Brooklyn (D)
Accurate Packaging, Inc., New York (B, E)
Arner Co., Buffalo (A, B, E)
Associated Brands, Inc., Brooklyn (B, C, E)
Carbona Products Co., Long Island City (B, E)
Cargo Packers, Inc., Brooklyn (A, D, E)
Cello-Masters, Inc., New York (A, E)
Dade, George C., Inc., Mineola (D, E)
Dyn Corp., New York (A, B, D, E)
Edlaw Packaging Co., Glendale (A, B)
•Evans Chemetics, Inc., New York (A, B)
Feder Industries, Inc., New York (E)
•Finkelstein, A. D., & Co., Suffern (A, D, E)
General Staple Co., New York (A)
Gesell, R., Inc., New York (A, B, D, E)
Gotham Plastics Corp., Bronx (E)
Gould, Jerome F., Corp., Brooklyn (D)
Greene Packaging Service, White Plains (B, E)
Leedpak-Leeds Sales Co., New York (A, B, D, E)
Le Sure Product Co., New York (B)
Marvell Pharmacal Co., New York (B, E)
Milpaco, Inc., Rochester (D, E)
•Miro Container Corp., Brooklyn (A, E)
Package Consultants, Inc., Brooklyn (A, B, D, E)
Pac-U-Craft, New York (A, E)
Sealed Liquids Co., New York (B)
Sonorol Laboratories, New York (B)
Talmalin Mfg. Co., New York (A, B)
Thomas, R. P., Co., Carle Place (A)
Trefolex, New York (A, B, D, E)
Van Pell Chemical & Supply Co., New York (A, B, C, E)
Visual Packaging Co., Brooklyn (A, E)
Wood & Brooks Co., Buffalo (A, D, E)

OHIO

Bernard's Laboratories, Cincinnati (A, B, D, E)
Chem-Pack, Inc., Cincinnati (A, B, D, E)
Cleveland Aerosol Packaging Corp., Cleveland (C)
Custom-Pak, Inc., Cincinnati (A, B, E)
Eveready Pressurized Products, Inc., Cleveland (B, C)
Pen-Mac-Nye Co., Akron (A, D, E)
Plasti-Kote, Inc., Cleveland (C)
•Products Packaging, Inc., Cleveland (A, B, E)
Reynolds Ink, Inc., Cleveland (C)
Ronor Corp., Cleveland (C)
Strong, Cobb & Co., Cleveland (A, B, C)

PENNSYLVANIA

Crawford Industries, Inc., Oil City (B)
Curley Co., Philadelphia (B, E)
Diaphane Corp., Philadelphia (A, D, E)
Draper & Emerick, Pittsburgh (A)
Hampton Products Co., Portland (C)
Koehler, Karl, Assoc., Coopersburg (E)
Seaboard Mfg. Laboratories, Inc., Philadelphia (A, B, E)
Sparks Corp., Philadelphia (A, B, E)
Stevens-Wiley Mfg. Co., Philadelphia (A, B, D, E)
United Packaging Co., Philadelphia (A, B, C, D, E)
West Penn Oil Co., Warren (B)
Windsor Chemical Laboratories, Philadelphia (B, C)

CANADA

Connecticut Chemicals (Canada) Ltd., Toronto (C)
Hunt, Harry E., Co., Toronto (A, E)
Sunway Fruit Products, Inc., Toronto (A)

ENGLAND

Technopol Laboratories Ltd., London (A, B)

MEXICO

Tecpak, S. A., Mexico, D. F. (A, B)

CONVERTERS OF FILMS

(Plastics & Cellophane)

For editorial information, see Section 4

A ABA Cellophane Products Corp., Pasadena, Calif.
Acme Cellophane Converting Co., Los Angeles
Aladdin Products Co., Woodside, N. Y.
Ames Bag Co., Selma, Ala.
Ames Harris Neville Co., San Francisco
•Angier Corp., Framingham, Mass.
Aravel Corp., New York
Arkell Safety Bag Co., New York
•Arvey Corp., Chicago
Atlanta Film Converting Co., Atlanta, Ga.
Austin Industries, Inc., Marlboro, Mass.
Avery Paper Co., Painesville, Ohio
Bauer & Black, Div. Kendall Co., Chicago
Bellen Co., Chicago
Blossom Mfg. Co., New York
Breetwor, I. N., & Assoc., Los Angeles
Brockton Mfg. Co., Brockton, Mass.
Brooks Paper Co., St. Louis, Mo.
COSECO, Los Angeles
Cadillac Products, Inc., Ferndale, Mich.
Canton Containers, Inc., Canton, Ohio
Cello Bag Co., Seattle, Wash.
Cello-Masters, Inc., New York
Cello-Pack, Inc., Buffalo, N. Y.
Cellophane Bag & Printing Corp., Brooklyn, N. Y.
Champion Bag Co., Chicago
Clinwill Plastics, Inc., Buffalo, N. Y.
Coating Products, Englewood, N. J.
Collier Mfg. Corp., Div. Warren Featherbone Co., Three Oaks, Mich.
Colonial Envelope Co., New York
Color Craft Display Corp., Long Island City, N. Y.
Comet Packaging & Paper Co., New York
Container Corp. of America, Chicago
•Continental Can Co., Shellmar-Betner Flexible Packaging Div., Mt. Vernon, Ohio
Crystal Tube Corp., Chicago
Crystal-X Corp., Lenni Mills, Pa.
Dalmas, Ltd., Leicester, England
•Davis, Joseph, Plastics Co., Arlington, N. J.
Deerfield Plastics Co., So. Deerfield, Mass.
Diaphane Corp., Philadelphia
•Dobeckmun Co., Cleveland
Dunmire Packaging Products Co., Los Angeles
Dura-Lee Corp., Kansas City, Mo.
Edlaw Packaging Co., Glendale, N. Y.
Electro-Technical Products, Div. Sun Chemical Corp., Nutley, N. J.
Elm Coated Fabrics Co., New York
Forbes Lithograph Mfg. Co., Boston
Frank Paper Products Corp., Detroit
Freedman, Leonard, & Sons, New York
Fuller Label & Box Co., Pittsburgh
Fulton Bag & Cotton Mills, Atlanta, Ga.
G & T Mfg. Co., New Britain, Conn.
General Films, Inc., Covington, Ohio
Gomar Mfg. Co., Newark, N. J.
Gregstrom Corp., Cambridge, Mass.
•Growers Container Corp., Salinas, Calif.
•H & R Industries, Nazareth, Pa.
Hedwin Corp., Baltimore, Md.
•J. E. Plastics Mfg. Corp., New York
Kehr Products Co., Philadelphia
Keystone Packaging Service, Easton, Pa.
King Plastic Products Corp., College Point, N. Y.
Levine, M. H., Co., New York
Magid-Robinson Co., New York
Mason Envelope Co., New York
Mehl Mfg. Co., Cincinnati
•Milprint, Inc., Milwaukee
•Miro Container Corp., Brooklyn, N. Y.
Modern Packages, Inc., Los Angeles
Modern Transparent Mfg. Co., Scranton, Pa.
Morrill Press, Fulton, N. Y.
Myron Mfg. Corp., New York
Nashua Corp., Nashua, N. H.
National Waterproof Papers, Inc., Beverly, N. J.
Newark Paraffine & Parchment Paper Co., Newark, N. J.
•Oneida Paper Products, Inc., Clifton, N. J.
Package Products Co., Charlotte, N. C.
Package-Craft, Inc., Paterson, N. J.
Par-Pak Co., Lakewood, Ohio
Pen-Mac-Nye Co., Akron, Ohio
Perry Envelope & Bag Co., New York
Pexco Bag Mfg. Co., Toledo, Ohio
Phoenix Products Co., Milwaukee
Plastic Packaging Co., Chicago
Plicose Mfg. Corp., Brooklyn, N. Y.
Poly Plastic Products, Inc., Paterson, N. J.
Prepac, Inc., New York
Printed Cellophane Tape Co., Los Angeles
Print-A-Tube Co., Rochelle Park, N. J.
Puritan Packaging Corp., Columbus, Ohio
•Quatrum Corp., Chicago
•Queen Transparent Specialties, Chicago
Raisin, John T., Corp., San Francisco
Ritchie, W. C., & Co., Chicago
Robert Corp., Lawrence, Mass.
Robinson, E. S. & A., (Canada) Ltd., Toronto, Ont.

Rollprint Products Corp., Chicago
Shopsin Paper Co., New York
Shore Line Industries, Inc., Clinton, Conn.
Siris, A. J., Products Corp., New York
Sparks Corp., Philadelphia
Specialty Papers Co., Dayton, Ohio
Speedmaster Packaging Corp., New York
Standard Cellulose & Novelty Co., Richmond Hill, N. Y.
Standard Packaging Corp., General Felt Products Div., Brooklyn, N. Y.
Stylecraft Packaging Service, Inc., Charlotte, N. C.
Tee-Pak, Inc., Chicago
Timely Packaging Assoc., New York
Transparent Packaging Corp., New York
Transparent Plastics Container Co., New York
Transparent Paper Ltd., London, England
Unger Paper Co., New York
United Mineral & Chemical Corp., New York
•United States Packaging Corp., Paterson, N. J.
Utility Plastic Bag Co., Div. Western Burlap Bag Co., Chicago
Vanant Products, Tomah, Wis.
Vis-A-Pac Co., Beverly, N. J.
W. E. W. Container Co., Brooklyn, N. Y.
Walsello Products, Inc., Paterson, N. J.
Whitehead & Hoag Co., Newark, N. J.
Winzen Research, Inc., Minneapolis
Wraps, Inc., New York
Wrapture, Inc., Flushing, N. Y.
Wyndmoor Mfg. Corp., Newark, N. J.

CONVERTERS OF RIGID PLASTIC SHEET

For editorial information, see Section 8

•American Cellubox Corp., Long Island City, N. Y.
Aravel Corp., New York
•Arvey Corp., Chicago
Blank, Arthur, & Co., Boston
Borkland Mfg. Co., Marion, Ind.
Chanal Plastics Corp., Brooklyn, N. Y.
•Chaspec Mfg. Co., Greenwich, Conn.
Clinwill Plastics, Inc., Buffalo, N. Y.
Clover Plastic Contours, Inc., E. Norwalk, Conn.
Collier Mfg. Corp., Div. Warren Featherbone Co., Three Oaks, Mich.
Color Craft Display Corp., Long Island City, N. Y.
Crook, William A., Watertown, Mass.
Crystal-X Corp., Lenni Mills, Pa.
•Davis, Joseph, Plastics Co., Arlington, N. J.
Dunmire Packaging Products Co., Los Angeles
Emeloid Co., Hillside, N. J.
Falge Engineering Corp., Bethesda, Md.
Forbes Lithograph Mfg. Co., Boston
G & T Mfg. Co., New Britain, Conn.
Gotham Plastics Corp., Bronx, N. Y.
Gregstrom Corp., Cambridge, Mass.
Hedwin Corp., Baltimore, Md.
Hopp Plastics, New York
•J. E. Plastics Mfg. Corp., New York
Just Plastics, Inc., New York
King Plastic Products Corp., College Point, N. Y.
Merit Displays, Paterson, N. J.
Myron Mfg. Corp., New York
Phoenix Products Co., Milwaukee
Pierson Assoc., Boston
•Plastic Artisans, Inc., White Plains, N. Y.
Plastofilm, Inc., Wheaton, Ill.
Plaxall, Inc., Long Island City, N. Y.
Ritchie, W. C., & Co., Chicago
Rome Plastic Specialties, Inc., Worcester, Mass.
Schmitz, Henry A., Inc., Ballston Spa, N. Y.
•Shaw-Randall Co., Pawtucket, R. I.
Sparks Corp., Philadelphia
Standard Cellulose & Novelty Co., Richmond Hill, N. Y.
Stensgaard, W. L., & Assoc., Inc., Chicago
Stylecraft Packaging Service, Inc., Charlotte, N. C.
Taylor Box Co., Warren, R. I.
Ve-Alite Plastic Corp., Brooklyn, N. Y.
•Vlchek Tool Co., Cleveland
Weaver Packaging Co., Montrose, Calif.
Weinman Brothers, Inc., Chicago
Wrapture, Inc., Flushing, N. Y.

CUSTOM PACKAGING
(See Contract Packaging)

CYLINDER ENGRAVING, ROTOGRAVURE

For editorial information, see Section 14

•Acme Gravure Services, Inc., Chicago
Beck Engraving Co., Philadelphia
•Intaglio Service Corp., New York
Inta-Roto Engraving Corp., Richmond, Va.
Modern Engraving & Machine Co., Hillside, N. J.
•Southern Gravure Service, Inc., Louisville, Ky.
Viking Engraving Corp., Columbus, Ohio

DECORATING ON GLASS, PLASTICS & CERAMICS

A. *Silk Screening*
B. *Printing*
C. *Etching*
D. *Hot Stamping*
E. *Spraying*

For editorial information, see Sections 8, 14

AP Applicator Co., Pleasantville, N. Y. (A, D, E)
Amos Molded Plastics, Edinburg, Ind. (A, B, C, D, E)
•Anchor Hocking Glass Corp., Lancaster, Ohio (A, B)
•Armstrong Cork Co., Lancaster, Pa. (A, D)
Art Decorating Co., No. Bergen, N. J. (A, B, D)
Art Tube Co., Irvington, N. J. (B, E)
Atlantic Plastics, Inc., Stamford, Conn. (D)
Austin, O., Brooklyn, N. Y. (A, B, E)
Blank, Arthur, & Co., Boston (A, B)
Bolta Products, Div. General Tire & Rubber Co., Lawrence, Mass. (B, D, E)
Borkland Mfg. Co., Marion, Ind. (A, B, E)
Braun, W., Co., Chicago (A, B, E)
Brockway Glass Co., Brockway, Pa. (A)
Carr-Lowrey Glass Co., Baltimore, Md. (A, C, E)
Ceragraphic, Inc., Newark, N. J. (A)
Chanal Plastics Corp., Brooklyn, N. Y. (A)
Claremould Plastics Co., Newark, N. J. (B, D)
Clinwill Plastics, Inc., Buffalo, N. Y. (D)
Closures, Inc., Waterbury, Conn. (E)
Collier Mfg. Corp., Div. Warren Featherbone Co., Three Oaks, Mich. (A, D)
Color Craft Display Corp., Long Island City, N. Y. (A)
Comet Packaging & Paper Co., New York (B)
Connecticut Plastic Products Co., Waterbury, Conn. (A, B, C, D)
Consumers Glass Co., Montreal, Que. (A)
Continental Glass Co., Chicago (A)
Copeland Displays, Inc., New York (A, D, E)
Crystal-X Corp., Lenni Mills, Pa. (A)
Custom-Pak, Inc., Cincinnati (B)
D & D Plastics, Inc., Van Dyke, Mich. (A, D)
Dec-Art Process Co., New York (A, B, D, E)
Decorating Process, Inc., Div. Fuld Bros., Inc., Baltimore, Md. (A)
Dura-Lee Corp., Kansas City, Mo. (B)
Einson-Freeman Co., Long Island City, N. Y. (A)
Emeloid Co., Hillside, N. J. (B, D, E)
Emerson Plastics Corp., New York (A, B, D, E)
Erie Resistor Corp., Plastics Div., Erie, Pa. (A, B, D, E)
Essex Paper Box Mfg. Co., Newark, N. J. (B, D)
Eyelet Specialty Co., Waterbury, Conn. (E)
Franklin Plastics, Inc., Franklin, Pa. (D, E)
Gemloid Corp., Elmhurst, N. Y. (A, B, D, E)
Glenshaw Glass Co., Glenshaw, Pa. (A)
Graphire Corp., New York (A, E)
Gregstrom Corp., Cambridge, Mass. (A, D)
•Hake Plastic Box Corp., Roanoke, Va. (D)
Hedwin Corp., Baltimore, Md. (A, D)
Highland Printers, Los Angeles (B)
Hopp Plastics, New York (B)
Ideal Gold Stamping Co., New York (D)
•J. E. Plastics Mfg. Corp., New York (A, B, D)
Jamison Plastic Corp., No. Bellmore, N. Y. (A, B, D, E)
Just Plastics, Inc., New York (A, C)
Kaltman Press, Inc., Long Island City, N. Y. (A, B)
King Plastic Products Corp., College Point, N. Y. (A, D, E)
Liebs, L. A. Co., New York (B)
PharmaPlastics, Inc., Baltimore, Md. (D)
Magill-Weinsheimer Co., Lincolnwood, Ill. (B)
Mankato Paper Box Co., Mankato, Minn. (B)
McKay Chemical Co., Brooklyn, N. Y. (C)
Michigan Collapsible Tube Co., East Detroit, Mich. (B)
Mirro-Products Co., High Point, N. C. (A)
Modern Art Printing Co., Woodside, N. Y. (B, D)
Modern Decorating Co., Paterson, N. J. (A, B, C, D)
Motson, J. Frank, Co., Flourtown, Pa. (A, B, E)
Myron Mfg. Corp., New York (A, D)
Palm Bros. Decalcomania Co., Cincinnati (A, B)
•Pennsylvania Glass Products Co., Pittsburgh (A)
•Permanent Label Corp., Bloomfield, N. J. (A, B, D, E)
Perm-O-Last Finishing Co., Waterbury, Conn. (C, E)
Pioneer Valley Plastics Co., Chicopee, Mass. (A, D)
Plastics, Inc., St. Paul, Minn. (A, D)
Plaxall, Inc., Long Island City, N. Y. (A, B, D, E)
Poly Perm Printing, Inc., New York (A)
Poly Plastic Products, Inc., Paterson, N. J. (B)
Polygon Products Co., Chicago (D)
Printed Cellophane Tape Co., Los Angeles (A, B)
Printloid, Inc., New York (A, B, D)
Process Displays, Inc., Milwaukee (A)
•Royal Mfg. Co., Prescott, Ariz. (A, B, D)
Schmitz, Henry A., Inc., Ballston Spa, N. Y. (A, B, D, E)
Seri Print, Inc., Waterbury, Conn. (A, E)
Sillcocks-Miller Co., Maplewood, N. J. (A, B, D)
Siris, A. J., Products Corp., New York (A)
Spielman Co., Philadelphia (A)
Stensgaard, W. L., & Assoc., Inc., Chicago (A)
Supreme Displays, Inc., New York (A)
Taylor Box Co., Warren, R. I. (D)
Thatcher Glass Mfg. Co., Elmira, N. Y. (A, E)
Thayer, Henry, Co., Cambridge, Mass. (A)
Transparent Plastics Container Co., New York (A, B, D)
Twinkle Display & Mfg. Co., Dallas, Texas (A, D)
Ve-Alite Plastic Corp., Brooklyn, N. Y. (A, D, E)
West Co., Phoenixville, Pa. (D)
Western Coil & Electrical Co., Racine, Wis. (A, B)

Wheaton Plastics Co., Mays Landing, N. J. (A, B, D)
Wheaton, T. C., Co., Millville, N. J. (A, B, E)
Whitehead & Hoag Co., Newark, N. J. (A, B)
Wilpet Tool & Mfg. Co., Kearny, N. J. (B)
Wilson, J. W., Glass Co., Brooklyn, N. Y. (A, B, D)
•Wirz, A. H., Inc., Chester, Pa. (B)
Wolf Die Cutting Co., Brooklyn, N. Y. (B)
Wrapture, Inc., Flushing, N. Y. (B)

DESIGNERS

(See Package Design Consultants)

DISPLAY MOUNTING & FINISHING

For editorial information, see Sections 2, 14

A-1 Mounting & Finishing Co., New York
Abana Products, Inc., Chicago
Acme Paper Box Co., San Francisco
American Die & Box Co., Denver, Colo.
Andre Paper Box Co., San Francisco
•Arvey Corp., Chicago
Boxcraft Paper Box Co., Oakland, Calif.
•Chaspec Mfg. Co., Greenwich, Conn.
Chicago Cardboard Co., Chicago
Display Finishing Co., Long Island City, N. Y.
Emson-Freeman Co., Long Island City, N. Y.
Essex Paper Box Mfg. Co., Newark, N. J.
Fenster, L., & Sons, Inc., Brooklyn, N. Y.
Forbes Lithograph Mfg. Co., Boston
Fountain Die Cutting Co., New York
King Plastic Products Corp., College Point, N. Y.
Lansky Die Cutting Corp., New York
Leominster Paper Box Co., Leominster, Mass.
Magill-Weinsheimer Co., Lincolnwood, Ill.
Mankato Paper Box Co., Mankato, Minn.
Merchandiser Press, Inc., New York
Merit Displays Co., Paterson, N. J.
Mullery Paper Packages, Inc., St. Paul Minn.
Nashua Paper Box Co., Nashua, N. H.
Pacific Paper Box Co., Portland, Ore.
Paper Converting & Finishing Co., Chicago
Pohlig Bros., Inc., Richmond, Va.
Reyburn Mfg. Co., Philadelphia
Schmitz, Henry A., Inc., Ballston Spa, N. Y.
Shadur Box Co., Milwaukee
Sillcocks-Miller Co., Maplewood, N. J.
Stylepak Box Corp., Los Angeles
Taylor Box Co., Warren, R. I.
Ve-Alite Plastic Corp., Brooklyn, N. Y.
Velvetone Finishing Corp., Long Island City, N. Y.
Warneke Paper Box Co., Denver, Colo.
Wells Badger Corp., Milwaukee
Westcott Paper Products Co., Detroit
Wolf Die Cutting Co., Brooklyn, N. Y.
York Display Finishing Co., Brooklyn, N. Y.

EMBOSSING, CUSTOM

For editorial information, see Sections 2, 14

Abana Products, Inc., Chicago
Andre Paper Box Co., San Francisco
Aravel Corp., New York
Artcraft Paper Box Co., Los Angeles
•Arvey Corp., Chicago
Boxcraft Paper Box Co., Oakland, Calif.
Camotone, Inc., Mamaroneck, N. Y.
Clinwill Plastics, Inc., Buffalo, N. Y.
•Chaspec Mfg. Co., Greenwich, Conn.
Connecticut Plastic Products Co., Waterbury, Conn.
•Crawford, John W., Co., New York
Dayton Embossed Products Corp., Dayton, Ohio
Dejonge, Louis, & Co., New York
Deline, I. A., Paper Boxes, Inc., Denver, Colo.
•Donrico, Inc., New York
Driscoll, Frank H., Co., Winston-Salem, N. C.
Emeloid Co., Hillside, N. J.
Emerson Plastics Corp., New York
Fitzhugh, William W., Inc., New York
•Foilcraft Printing Corp., Brooklyn, N. Y.
Freedman, Leonard, & Sons, New York
Gamper Printing & Bronzing Co., New York
Gemloid Corp., Elmhurst, N. Y.
Hedwin Corp., Baltimore, Md.
Henschel, C. B., Mfg. Co., Milwaukee
King Plastic Products Corp., College Point, N. Y.
Lansky Die Cutting Corp., New York
Liebs, L. A., Co., New York
Lithographers Finishing Co., New York
Magid-Robinson Co., New York
Marvellum Co., Holyoke, Mass.
•Matthias Paper Corp., Philadelphia
Michigan Lithographing Co., Grand Rapids, Mich.
Middlesex Products Corp., Cambridge, Mass.
•Milprint, Inc., Milwaukee
National Foil Co., Elizabeth, N. J.
Orchard Paper Co., St. Louis, Mo.
Paper Converting & Finishing Co., Chicago
Plicose Mfg. Corp., Brooklyn, N. Y.
Schmitz, Henry A., Inc., Ballston Spa, N. Y.
Siris, A. J., Products Corp., New York
Smith, S. K., Co., Chicago
Standard Rolling Mills, Brooklyn, N. Y.
Stylepak Box Corp., Los Angeles
•Sweetnam, George H., Inc., Cambridge, Mass.
•U. S. Printing & Lithograph Co., Cincinnati
Ve-Alite Plastic Corp., Brooklyn, N. Y.
Weil & Newman, Inc., Brooklyn, N. Y.
Whitehead & Hoag Co., Newark, N. J.
Whiting, C. R., Co., Hackensack, N. J.
Wyndmoor Mfg. Corp., Newark, N. J.

FINISHING & COATING, CUSTOM

(Lacquers & Varnishes)

For editorial information, see Section 2

Ackerman, G. A., Printing Co., Cicero, Ill.
Andre Paper Box Co., San Francisco
Aravel Corp., New York
Austin, O., Brooklyn, N. Y.
Camotone, Inc., Mamaroneck, N. Y.
•Chaspec Mfg. Co., Greenwich, Conn.
•Crawford, John W., Co., New York
Dejonge, Louis, & Co., New York
Electro-Technical Products, Div. Sun Chemical Corp., Nutley, N. J.
Fitzhugh, William W., Inc., New York
Forbes Lithograph Mfg. Co., Boston
Franklin Plastics, Inc., Franklin, Pa.
Freedman, Leonard, & Sons, New York
General Plastics Corp., Paterson, N. J.
Gomar Mfg. Co., Newark, N. J.
Hedwin Corp., Baltimore, Md.
Henschel, C. B., Mfg. Co., Milwaukee
Lithographers Finishing Co., New York
Long Island Finishing Corp., Long Island City, N. Y.
Magill-Weinsheimer Co., Lincolnwood, Ill.
McCoy Paper Converters, Philadelphia
•Michigan Carton Co., Battle Creek, Mich.
Michigan Lithographing Co., Grand Rapids, Mich.
Mor-Gan Laminating & Foliating Co., New York
National Foil Co., Elizabeth, N. J.
Orchard Paper Co., St. Louis, Mo.
Paper Converting & Finishing Co., Chicago
Perfect Finishing Co., New York
Perm-O-Last Finishing Co., Waterbury, Conn.
Price Bros. Lithograph Co., Bridgeton, N. J.
Pyroxylin Products, Inc., Chicago
•Rhinelander Paper Co., Rhinelander, Wis.
Robinson, E. S. & A., (Canada) Ltd., Toronto, Ont.
Royal Paper Corp., New York
Seri Print, Inc., Waterbury, Conn.
Shopsin Paper Co., New York
Standard Packaging Corp., General Felt Products Div., Brooklyn, N. Y.
Ve-Alite Plastic Corp., Brooklyn, N. Y.
Walle & Co., New Orleans, La.
Whiting, C. R., Co., Hackensack, N. J.
Wrapture, Inc., Flushing, N. Y.
Wyndmoor Mfg. Corp., Newark, N. J.

FLOCKING

For editorial information, see Section 2

AP Applicator Co., Pleasantville, N. Y.
Austin, O., Brooklyn, N. Y.
•Chaspec Mfg. Co., Greenwich, Conn.
Copeland Displays, Inc., New York
Fuller Label & Box Co., Pittsburgh
•Hinde & Dauch, Sandusky, Ohio
Kaltman Press, Long Island City, N. Y.
Merit Displays Co., Paterson, N. J.
Rayon Processing Co. of R. I., Pawtucket, R. I.
Schmitz, Henry A., Inc., Ballston Spa, N. Y.
Shaw Paper Box Co., Pawtucket, R. I.
•Shaw-Randall Co., Pawtucket, R. I.
Ve-Alite Plastic Corp., Brooklyn, N. Y.
Velvetone Finishing Corp., Long Island City, N. Y.

FOLDING, CUSTOM

(Package Inserts)

For editorial information, see Section 2

ADF Packaging Service, Suffern, N. Y.
Advance Packaging Co., Chicago
•Arvey Corp., Chicago
Boxcraft Paper Co., Oakland, Calif.
Camotone, Inc., Mamaroneck, N. Y.
Douglas Chemical Co., No. Kansas City, Mo.
Dyn Corp., New York
Forbes Lithograph Mfg. Co., Boston
Gilosa, Joseph A., New York
Koehler, Karl, Assoc., Coopersburg, Pa.
Magill-Weinsheimer Co., Lincolnwood, Ill.
Michigan Lithographing Co., Grand Rapids, Mich.
Par-Way Custom Packaging, South Gate, Calif.
Price Bros. Lithograph Co., Bridgeton, N. J.
Schmitz, Henry A., Inc., Ballston Spa, N. Y.
Sparks Corp., Philadelphia
Wolf Die Cutting Co., Brooklyn, N. Y.

LABORATORIES, RESEARCH & TESTING, INDEPENDENT

For editorial information, see Section 2

Arnkurt Associate Engineers, New York
Bauer, Robert E., Philadelphia
Bowser-Morner Testing Laboratories, Dayton, Ohio
Container Laboratories, Inc., Chicago
DeBell & Richardson, Inc., Hazardville, Conn.
Institute of Paper Chemistry, Appleton, Wis.
Levey, Harold A., Labs., New Orleans, La.
Paige, Richard E., Inc., New York
Pitkin, Lucius, Inc., New York
Quinn, Don L., Co., Chicago
Radiation Applications, Inc., New York
Snell, Foster D., Inc., New York
Sonorol Laboratories, New York
United States Testing Co., Hoboken, N. J.

LAMINATING, CUSTOM

For editorial information, see Section 2

•Acme Backing Corp., Stamford, Conn.
•Angier Corp., Framingham, Mass.
•Arvey Corp., Chicago
Avery Paper Co., Painesville, Ohio
•Butterfield-Barry Co., Teterboro, N. J.
Cahill, J. D., Co., Haverhill, Mass.
Camotone, Inc., Mamaroneck, N. Y.
Camp Mfg. Co., Franklin, Va.
Cheslam Corp., Yonkers, N. Y.
Climax Fibre Drum Co., Carthage, N. Y.
•Cochran Foil Co., Louisville, Ky.
•Continental Can Co., Shellmar-Betner Flexible Packaging Div., Mt. Vernon, Ohio
•Cromwell Paper Co., Chicago
Dikeman Laminating Corp., Clifton, N. J.
Driscoll, Frank H., Co., Winston-Salem, N. C.
Electro-Technical Products, Div. Sun Chemical Corp., Nutley, N. J.
Emeloid Co., Hillside, N. J.
Fleishhacker Paper Box Co., San Leandro, Calif.
Fulton Bag & Cotton Mills, Atlanta, Ga.
Gomar Mfg. Co., Newark, N. J.
Guardian Paper Co., Oakland, Calif.
Hedwin Corp., Baltimore, Md.
Henschel, C. B., Mfg. Co., Milwaukee
Hopp Plastics, New York
Leominster Paper Box Co., Leominster, Mass.
Lithographers Finishing Co., New York
Long Island Finishing Corp., Long Island City, N. Y.
Marvellum Co., Holyoke, Mass.
Maryland Paper Box Co., Baltimore, Md.
•Matthias Paper Corp., Philadelphia
•Melrose Packaging, New York
•Milprint, Inc., Milwaukee
Mor-Gan Laminating & Foliating Co., New York
Nashua Paper Box Co., Nashua, N. H.
National Foil Co., Elizabeth, N. J.
National Waterproof Papers, Inc., Beverly, N. J.
Newark Paraffine & Parchment Paper Co., Newark, N. J.
Orchard Paper Co., St. Louis, Mo.
Pacific Coast Foil Co., Div. Jorgenson & Co., San Francisco
Paperboard Laminating Corp., Norwalk, Conn.
Paper Converting & Finishing Co., Chicago
Perry Envelope & Bag Co., New York
Print-A-Tube Co., Rochelle Park, N. J.
Printloid, Inc., New York
Protexall Permanent Process Service, Kansas City, Mo.
•Rhinelander Paper Corp., Brooklyn, N. Y.
Rupaco Paper Corp., Brooklyn, N. Y.
Shopsin Paper Co., New York
Sillcocks-Miller Co., Maplewood, N. J.
Southland Paper Converting Co., Los Angeles
Specialty Papers Co., Dayton, Ohio
Standard Cellulose & Novelty Co., Richmond Hill, N. Y.
Standard Insulation Co., East Rutherford, N. J.
•Standard Packaging Corp., Flex-Vac Div., New York
Standard Rolling Mills, Brooklyn, N. Y.
•Sweetnam, George H., Inc., Cambridge, Mass.
Unger Paper Co., New York
•United Board & Carton Corp., New York
United Mineral & Chemical Corp., New York
Vanant Products, Tomah, Wis.
Virginia Laminating Co., Amelia, Va.
•Western Waxed Paper Div., Crown Zellerbach Corp., San Leandro, Calif.
Whitehead & Hoag Co., Newark, N. J.
Wood & Brooks Co., Buffalo, N. Y.
Wyndmoor Mfg. Corp., Newark, N. J.

LITHOGRAPHERS, PAPER

For editorial information, see Section 2

Ackerman, G. A., Printing Co., Cicero, Ill.
Artcraft Paper Box Co., Los Angeles
Butler & Ferrigno Lithographic Co., Philadelphia
Brandau Craig Dickerson Co., Nashville, Tenn.
Brett Lithographing Co., Long Island City, N. Y.
Cardinal Lithograph Co., Los Angeles
Color Craft Display Corp., Long Island City, N. Y.
Edwards & Deutch Lithographing Co., Chicago
Einson-Freeman Co., Long Island City, N. Y.
Epsen Lithographing Co., Omaha, Neb.
Essex Paper Box Mfg. Co., Newark, N. J.
Forbes Lithograph Mfg. Co., Boston
Herald Press, Inc., Charlotte, N. C.
Independent Lithograph Co., San Francisco
Inland Lithograph Co., Chicago
Kaltman Press, Long Island City, N. Y.
Ketterlinus Litho. Mfg. Co., Primos, Pa.
Kindred, MacLean & Co., Long Island City, N. Y.
Magill-Weinsheimer Co., Lincolnwood, Ill.
McCandlish Lithograph Corp., Philadelphia
Meehan Tooker Co., New York
Michigan Lithographing Co., Grand Rapids, Mich.
•Milprint, Inc., Milwaukee
Muirson Label Co., San Jose, Calif.
New York Label & Box Corp., New York
Oberly & Newell Litho. Corp., New York
Pacific Coast Foil Co., Div. Jorgenson & Co., San Francisco
Penn Lithographing Co., Philadelphia
Rand Avery-Gordon Taylor, Inc., Boston
Rollprint Products Corp., Chicago
Schmidt Lithograph Co., San Francisco
Stecher-Traung Lithograph Corp., Rochester, N. Y.
Sweeney Lithograph Co., Belleville, N. J.
Trautmann, Bailey & Blampey, New York
•U. S. Printing & Lithograph Co., Cincinnati
Veritone Co., Chicago
Walle & Co., New Orleans, La.
Wedgewood Press, Inc., New York
Weil's, David, Sons Lithographic Co., Brooklyn, N. Y.
Western Lithograph Co., Los Angeles
Zipprodt, Inc., Chicago

MOLDERS, PLASTIC

For editorial information, see Section 8

A. J. & K. Co., Colchester, Conn.
AP Applicator Co., Pleasantville, N. Y.
Accurate Molding Corp., Long Island City, N. Y.
Advance Mfg. Co., Brooklyn, N. Y.
Ambassador Plastics & Mfg. Corp., Chicago
Ames Bag Co., Selma, Ala.
Amos Molded Plastics, Edinburg, Ind.
•Anchor Hocking Glass Corp., Lancaster, Ohio
•Armstrong Cork Co., Lancaster, Pa.
Associated Plastic Companies, Midland, Mich.
Atlantic Plastics, Inc., Stamford, Conn.
•Auburn Button Works, Inc., Auburn, N. Y.
•Ball Brothers Co., Muncie, Ind.
Boonton Molding Co., Boonton, N. J.
Braun-Crystal Mfg. Co., Middle Village, N. Y.
Buckeye Molding Co., Miamisburg, Ohio
Butterfield, T. F., Inc., Naugatuck, Conn.
Button Corp. of America, Newark, N. J.
C & M Mfg. Co., Providence, R. I.
Central Plastic Corp., Leominster, Mass.
Chippewa Plastics, Chippewa Falls, Wis.
Cincinnati Molding Co., Cincinnati
Claremould Plastics Co., Newark, N. J.
•Colt's Manufacturing Co., Hartford, Conn.
Columbus Plastic Products, Inc., Columbus, Ohio
Commonwealth Plastics Corp., Leominster, Mass.
Conart Co., Glen Head, N. Y.
Connecticut Plastic Products Co., Waterbury, Conn.
Continental Plastics Corp., Chicago
Cruver Manufacturing Co., Chicago
D & D Plastics, Inc., Van Dyke, Mich
Dapol Plastics, Inc., Worcester, Mass.
Davies, Harry, Molding Co., Chicago
•Davis, Joseph, Plastics Co., Arlington, N. J.
DuBois Plastic Products, Inc., Buffalo, N. Y.
Emeloid Co., Hillside, N. J.
Emerson Plastics Corp., New York
Erie Resistor Corp., Plastics Div., Erie, Pa.
Flyndustries, Inc., New York
Formold Plastics, Inc., Blue Island, Ill.
Foster Grant Co., Leominster, Mass.
Frank Paper Products Corp., Detroit
Franklin Plastics, Inc., Franklin, Pa.
Gemloid Corp., Elmhurst, N. Y.
General Electric Co., Chemical & Metallurgical Div., Pittsfield, Mass.
•Gilbert Plastics, Inc., Hillside, N. J.
Gulliksen, Wm. M., Mfg., Co., Newton Lower Falls, Mass.
Holstein, Lee, Injection Molding, Inc., Clifton, N. J.
Hopp Plastics, New York
Irwin Corp., Nashua, N. H.
Jamison Plastic Corp., No. Bellmore, N. Y.
Keolyn Plastics, Inc., Chicago
King Plastic Products Corp., College Point, N. Y.
Kollercraft Plastic Products, Fenton, Mo.
Lurie Plastics, Inc., Colonial Heights, Va.
•Mack Molding Co., Wayne, N. J.
Maryland Plastics, Inc., New York
Massachusetts Plastic Corp., Ludlow, Mass.
Mid-America Plastics, Inc., Cleveland
Molded Insulation Co., Philadelphia
Molded Products Div., Admiral Corp., West Chicago, Ill.
Moonglow Novelty Corp., New York
Mutual Plastic Mold Co., South Gate, Calif.
Nalle Plastics, Inc., Austin, Texas
Norton Laboratories, Inc., Lockport, N. Y.
Nosco Plastics, Inc., Erie, Pa.
Olympic Plastics Co., Los Angeles
Oris Mfg. Co., Thomaston, Conn.
Paragon Molded Plastics, Seattle, Wash.
Park Plastics Co., Linden, N. J.
Peoria Plastic Co., E. Peoria, Ill.
PharmaPlastics, Inc., Baltimore, Md.
Plastal Specialties Co., Seattle, Wash.
Plasticite Corp., New York
Plastics, Inc., St. Paul, Minn.
Plastic Molded Products Co., Chicago
Plasti-Pak Containers, Ltd., Toronto, Ont.
Plastomatic Corp., Malvern, Pa.
Polygon Products Co., Chicago
Pyro Plastics Corp., Union, N. J.
Richardson Co., Melrose Park, Ill.
Rogers, V. F., Denver, Colo.
•Royal Mfg. Co., Prescott, Ariz.
St. Regis Paper Co., Panelyte Div., New York
Scarmar Mfg. Co., Paterson, N. J.
•Scott Plastics, Hartford, Conn.
Shaw Insulator Co., Irvington, N. J.
Sillcocks-Miller Co., Maplewood, N. J.
Southern California Plastic Co., Glendale, Calif.
Southern Plastics Co., Columbia, S. C.
Steiner Plastics Mfg. Co., Glen Cove, N. Y.
Terkelsen Machine Co., Boston
•Tupper Corp., Blackstone, Mass.
Twinkle Display & Mfg. Co., Dallas, Texas
United Comb & Novelty Co., Leominster, Mass.
Vacuum Molding, Inc., Boonton, N. J.
Ve-Alite Plastic Corp., Brooklyn, N. Y.

•Vichek Tool Co., Cleveland
•Waterbury Companies, Inc., Waterbury, Conn.
Watertown Mfg. Co., Watertown, Conn.
Western Coil & Electrical Co., Racine, Wis.
Wheaton Plastics Co., Mays Landing, N. J.
Whyte Mfg. Co., New York.
Wilpet Tool & Mfg. Co., Kearny, N. J.
•Wirz, A. H., Inc., Chester, Pa.

PACKAGE DESIGN CONSULTANTS (Independent Organizations)

For editorial information, see Section 2

CALIFORNIA

Cruze, Charles, Los Angeles
Design Development Assoc., San Francisco
Jepson, Tinsley T., Pasadena
Jolley, Jerry, San Francisco
Kornfeld, Herbert L., Hollywood
Kosmak, George, San Francisco
Kraber, George R., Los Angeles
Kweller, Sam, Los Angeles
Landor, Walter, & Assoc., San Francisco
Marks, Edward M., Co., Los Angeles
Merendino-Greene, Pasadena
Sampson, Cornelius, & Assoc., San Francisco
Weatherwax-Spurgeon & Assoc., Los Angeles
Wheeler, Leonard A., Los Angeles

COLORADO

Cormack, Robert B., Denver

CONNECTICUT

Colgate, W. Homer, West Redding
Florian, Gordon, Bridgeport
Hedu, Jon, Watertown
Hinckley Associates, Bridgeport
Koehler & Worden, Westport
Neubauer, Robert G., Inc., Bridgeport
Nielsen, William R., Westport
Taylor, Charles H., Riverside

GEORGIA

Grau, Russell, Atlanta

ILLINOIS

Adams, Eugene C., Assoc., Maywood
Akers, Charles E., Chicago
Associated Designers, Chicago
Bielefeld Studios, Chicago
Bryant, Jerry, Chicago
Carter, Joseph, Chicago
Casler, Arvid, Des Plaines
Chapman, Dave, Chicago
Chirpe, W. Rodney, Chicago
Color Research Institute, Chicago
Dewitz, J. Henry, Studios, Chicago
Dickens, Robert Sidney, Chicago
Farrell, Harry H., Chicago
Hassler, W. Scott, Assoc., Chicago
Jackson, McStay Co., Chicago
Jones, Charles E., & Assoc., Chicago
Jones, E. Willis, Chicago
Lea-Tek Studios, Lake Zurich
Leavitt, S. Taylor, Assoc., Chicago
Mangan & Eckland, Chicago
Nugent-Graham Studios, Chicago
Olsen, Andrew P., Chicago
Port Studios, Chicago
Quinn, Don L., Co., Chicago
Reinecke & Assoc., Chicago
Richards, Harper, Chicago
Rosen, Cele, Chicago
Sackett, DeForest, Chicago
Schrom, Archie M., Chicago
Schwarz, Norbert F., Chicago
Shaw, A. E. & R. C., Chicago
Spuehler, Ernst A., Elgin
Tammen & Denison, Inc., Chicago
Whitaker-Guernsey Studio, Chicago

KENTUCKY

Tarpey, Thomas, Louisville

MAINE

Koster, Louis, Assoc., Freeport

MARYLAND

Dadmun, Royal, & Assoc., Baltimore
Gisreal, George L., Baltimore

MASSACHUSETTS

Alcott Assoc., Islington
Ayres, Jr., Samuel, Assoc., Boston
Barkley & Dexter, Boston
Green, Frank W., Co., East Longmeadow
Hollis, Morton, Boston
Larkin & Glassman Assoc., Boston
Marsh, George, Boston
Schuman, Harold, Boston

MICHIGAN

Ford, W. B., Design Corp., Detroit
Harley Earl, Inc., Center Line
Swibold, Duane, Saginaw

MINNESOTA

Darr, Harold W., Assoc., Minneapolis

MISSOURI

Gambon, Thomas F., St. Louis
Glave, K. L., & Assoc., Webster Groves
Louden, Lillian, St. Louis

NEW JERSEY

Chipman, Richmond Lane, Jr., Montclair
Schnur-Appel, Union
Tickner, E. C., Summit
Zackheim, Eli A., So. Plainfield

NEW YORK

Abend, Chester Joshua, Queens
Ahrend Associates, New York
Alko, Al, Jamaica
Allcolor Co., New York
Anderson, Milton, Co., New York
Arbib, Richard, Co., New York
Arens, Egmont, New York
Arnkurt Associate Engineers, New York
•Assn. of Creative Artists, Inc., New York
Banever, Gilbert, & Assoc., New York
Bauer, Litzy R., Flushing
Beall, Lester, New York
Becker & Becker Assoc., New York
Berger, Alan, New York
Bernhard, Lucian, Studio, New York
Berni, Alan, & Assoc., New York
Beyer, Dick, New York
Biro Assoc., New York
Blumenthal, Margaret M., New York
Brand, Ruth, No. Merrick
Brauer, Fred J., New York
Brice, John & Earline, New York
Cabot, Petra, New York
Chargar, Ruth, New York
Chinkes, Sam, & Assoc., Bronx
Clarke, Rene, New York
Condon, Frank, Assoc., Northport
Couper, Don, Pound Ridge
Creators Art Service, New York
Croce, Isabel M., New York
Crown Color & Design Corp., New York
D'Addario, Thomas, Studios, New York
Davies, Helen, & Assoc., New York
Dean, Chas., C. S., New York
De Nina, James Andrew, New York
Design Associates, New York
Deskey, Donald, Assoc., New York
Dralle, Elizabeth M., New York
Dunbar, E. Helen, New York
Dusseau, Lambert, New York
Ehrman, Ernst, New York
Ellender, Raphael, New York
Federico, Joseph B., Buffalo
Ferguson, Martin J., Rye
Ferster, Reinhold C., Buffalo
Fink, Karl, New York
Foster, Alan, Assoc., New York
Gianninoto, Frank, & Assoc., New York
Goldberg, Robert I., Assoc., New York
Goldman, Neal, Assoc., New York
Grimes, Rose, New York
Grover, Frederic S., Assoc., Rochester
Gruen, Robert, Assoc., New York
Hagopian, Vahan, New York
Hall, Frances Cushing, Alfred
Heythum, Antonin, De Witt
Hills, David Bennett, New York
Hodges, Guy, New York
Hornung, Clarence P., New York
Huxtable, L. Garth, New York
Ingersoll Studios, New York
Jacobsson, Edward Gustave, New York
Jay, Norbert, New York
Johnson, Mary Russell, New York
Ketcham, Howard, New York
Kleinhans, Herbert F., New York
Kogan, Belle, Assoc., New York
Koodin-Lapow Assoc., New York
Koppel, E. Leonard, New York
Korda Assoc., New York
Kurnit-Geller Assoc., New York
Lamarque, Abril, New York
Lescaze, William, New York
Levin, Monte L., New York
Lewis, Ben, New York
Lippincott & Margulies, Inc., New York
Loederer, Richard A., New York
Loewy, Raymond, Assoc., New York
Lucas, Mildred, New York
Lustig, Alvin, New York
Markley, Margery, New York
Marohn, Lane, New York
Metzig, William, New York
Nash, Jim, New York
Nelson, George, & Assoc., New York
Nesbitt Assoc., New York
Nickelsen, John, Flushing
Nielsen, William R., New York
Oppa, E. T., Assoc., New York
Otto, Carl, New York
Paige, Richard E., Inc., New York
Park, Helen, New York
Parzinger, Tommi, New York
Paxton, Krueger & Assoc., New York
Picken, Mary Brooks, New York
Pletcher & Pollack, New York
Poliner, William, Bronx
Powell, Gerry, Assoc., New York
Powers, Joseph, New York
Reiner, George, Studio, New York
Sakier, George, New York
Samuel, Berte, New York
Sanford, H. C., Assoc., New York
Scheele, Edwin H., Woodside, N. Y.
Schusterman, William V., New York
Schladermundt, Peter, New York
Schoen, Eugene, New York
Shayn, John, Studio, New York
Singer, Lawrence H., Levittown
Slobodkin, Simon, New York
Snell, Foster D., Inc., New York
Snyder, Gilbert, New York
Spilman, Raymond, New York
Stahl, Gerald, New York
Stahlhut, Henry J., New York
Steinweiss, Alex, Atlantic Beach
Summon & Summon, New York
Sutner-office, New York
Tavor, Luba, New York
Teague, Walter Dorwin, Assoc., New York
Teddy Studios, New York
Thompson, Bernard L., New York
Van Der Woerd, Bart, New York
Van Rosen, Robert E., New York
Vassos, John, New York
Von Miklos, Josephine, Poundridge
Webster, Benjamin L., Woodstock
Wilson, Scott, New York
Wolke, Karel, New York
Zeidman, Robert, Assoc., New York
Zelenko, Harry & Marion, New York
Zweybruck, Emmy, New York

OHIO

Bracy & Bracy, Cleveland
Designers for Industry, Inc., Cleveland
Fuerst, Edwin W., Toledo

PENNSYLVANIA

Bauer, Robert E., Philadelphia
Boren Industrial Designers, Newtown
Kamp, Bruce, Assoc., Philadelphia
Muller-Munk, Peter., Pittsburgh
Pull-Packaging, Inc., Philadelphia
Richman, Mel, Studios, Philadelphia
Van Doren, Harold, & Assoc., Philadelphia

TEXAS

Crane, Susan, Gift Packaging, Dallas

WISCONSIN

Anderson, Ralph, Green Bay
Franz, Richard M., Milwaukee
Hallam, Ben, Studio, Racine
Milwaukee Industrial Designers, Milwaukee
Royce, Clint, Assoc., Milwaukee

PHOTOENGRAVING, RUBBER PRINTING PLATE PATTERNS

For editorial information, see Section 14

•Mosstype Corp., Brooklyn, N. Y.
Pannier Corp., Pittsburgh
•Rau Rubber Engraving Co., Hackensack, N. J.
•Southern Gravure Service, Inc., Louisville, Ky.

PLATING & METALLIZING PLASTICS

For editorial information, see Section 8

Amos Molded Plastics, Edinburg, Ind.
•Arvey Corp., Chicago
•Ball Brothers Co., Muncie, Ind.
Coating Products, Englewood, N. J.
Connecticut Plastic Products Co., Waterbury, Conn.
Cruver Manufacturing Co., Chicago
Emeloid Co., Hillside, N. J.
Erie Resistor Corp., Plastics Div., Erie, Pa.
Eyelet Specialty Co., Waterbury, Conn.
G & T Mfg. Co., New Britain, Conn.
Gomar Mfg. Co., Newark, N. J.
Hastings & Co., Philadelphia
Hy-Sil Mfg. Co., Revere, Mass.

POLYETHYLENE TREATING

For editorial information, see Sections 2, 4

•Traver Investments, Inc., Chicago

PRIVATE LABEL PACKAGING

(See Contract Packaging)

SAMPLE & PACKAGE DISTRIBUTION

For editorial information, see Section 2

ADF Packaging Service, Suffern, N. Y.
Advance Packaging Co., Chicago
Cargo Packers, Inc., Brooklyn, N. Y.
Dyn Corp., New York
Edlaw Packaging Co., Glendale, N. Y.
•Finkelstein, A. D., & Co., Suffern, N. Y.
Hurwich, R., Co., Berkeley, Calif.
Karp Co., Jersey City, N. J.
•Packaging Service Corp., Chicago
Pack-It, Newark, N. J.
Private Brands, Inc., Clifton, N. J.
Sparks Corp., Philadelphia
Trefolex, New York
Visual Packaging Co., Brooklyn, N. Y.
•Whaling Distributing Corp., New York

VACUUM FORMING, THERMOPLASTIC SHEET

For editorial information, see Section 8

Ad Vac Plastics Corp., Indianapolis
Advance Mfg. Co., Brooklyn, N. Y.
Aravel Corp., New York
•Ball Brothers Co., Muncie, Ind.
Bardes, A. G., Co., Milwaukee
Borkland Mfg. Co., Marion, Ind.
Celwa Products Co., New York
Chanal Plastics Corp., Brooklyn, N. Y.
Cheslam Corp., Yonkers, N. Y.
Clinwill Plastics, Inc., Buffalo, N. Y.
Color Craft Display Corp., Long Island City, N. Y.
Copeland Displays, Inc., New York
Crook, William A., Watertown, Mass.
Dunmire Packaging Products Co., Los Angeles
Eclipse Plastic Industries, Inc., Sarasota, Fla.
Einson-Freeman Co., Long Island City, N. Y.
Emeloid Co., Hillside, N. J.
Emerson Plastics Corp., New York
Federal Tool Corp., Chicago
Freedman, Leonard, & Sons, New York
Gregstrom Corp., Cambridge, Mass.
Hedwin Corp., Baltimore, Md.
Imperial Paper Box Corp., Brooklyn, N. Y.
•J. E. Plastics Mfg. Corp., New York
Just Plastics, Inc., New York
Kage Co., Manchester, Conn.
King Plastic Products Corp., College Point, N. Y.
Lewy, Morris L., & Co., New York
Mankato Paper Box Co., Mankato, Minn.
Merit Displays Co., Paterson, N. J.
•Miro Container Corp., Brooklyn, N. Y.
Mirro-Products Co., High Point, N. C.
National Vacuum Molding Corp., Yonkers, N. Y.
Paper Package Co., Indianapolis
Pioneer Folding Box Co., Chicopee, Mass.
Pioneer Valley Plastics Co., Chicopee, Mass.
•Plastic Artisans, Inc., White Plains, N. Y.
Plasticite Corp., New York
Plastics, Inc., St. Paul, Minn.
Plastofilm, Inc., Wheaton, Ill.
Plaxall, Inc., Long Island City, N. Y.
Printloid, Inc., New York
Regal Plastic Co., Kansas City, Mo.
Richardson Co., Melrose Park, Ill.
St. Regis Paper Co., Panelyte Div., New York
Schmitz, Henry A., Inc., Ballston Spa, N. Y.
Shaw Paper Box Co., Pawtucket, R. I.
•Shaw-Randall Co., Pawtucket, R. I.
Sillcocks-Miller Co., Maplewood, N. J.
Sparks Corp., Philadelphia
Standard Cellulose & Novelty Co., Richmond Hill, N. Y.
Steiner Plastics Mfg. Co., Glen Cove, N. Y.
Stensgaard, W. L., Assoc., Inc., Chicago
Taylor Box Co., Warren, R. I.
Twinkle Display & Mfg. Co., Dallas, Texas
Utility Bag Co., Div. Western Burlap Bag Co., Chicago
Vacuum Molding, Inc., Boonton, N. J.
Vacuum Plastics Corp., Columbus, Ohio
Valentine Process Corp., Rochelle Park, N. J.
Ve-Alite Plastic Corp., Brooklyn, N. Y.
Velvetone Finishing Corp., Long Island City, N. Y.
•Vlchek Tool Co., Cleveland
Western Coil & Electrical Co., Racine, Wis.
Whitehead & Hoag Co., Newark, N. J.
Whyte Mfg. Co., New York
Woolf, Irving, & Co., Chicago
Zumbiel, C. W., Co., Cincinnati

NEED MORE INFORMATION?

This Buyers' Directory is as complete as a year's hard work and the splendid cooperation of scores of supplying companies can make it. Nevertheless, there's always the possibility that it doesn't provide the answer to your particular procurement problem. The difficulty may be simply a matter of difference in terminology, of improper listing, of accidental omission or some such.

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READERS' SERVICE DEPARTMENT

MODERN PACKAGING

575 Madison Avenue New York 22, N.Y.

Alphabetical List of Companies and Addresses

A

A. A. Accurate Packaging Service, 1415 Golf Road, Des Plaines, Ill.
AAAAAA-Ace Paper Box Corp., 472 Broadway, New York 13, N. Y.
A ABA Cellophane Products Corp., 145 Waverly Drive, Pasadena 2, Calif.
A-B-C Packaging Machine Corp., 102 S. Front St., Quincy, Ill.
A D F Packaging Service, 15 Wayne Ave., Suffern, N. Y.
A. J. & K. Company, Box #146, Colchester, Conn.
A. & M. Tool & Die Co., Inc., Foster St., Southbridge, Mass.
A-1 Mounting & Finishing Co., 614 W. 131 St., New York 27, N. Y.
AP Applicator Co., 128 Wheeler Ave., Pleasantville, N. Y.
Aacon Contracting Co., Inc., 145 Wolcott St., Brooklyn 31, N. Y.
Abana Products, Inc., 2500 N. Pulaski Road, Chicago 39, Ill.
Abbeon Supply Co., 179-15 Jamaica Ave., Jamaica 32, N. Y.
Abbott Plastic Machine Corp., 6322 N. Clark St., Chicago 26, Ill.
Abend, Chester Joshua, 19-20——147th St., Whitestone, Queens, N. Y.
Able Engineering, Inc., 607——22nd Ave., N.E., Minneapolis 18, Minn.
Accurate Box Co., Inc., 260 Miller St., Newark, N. J.
Accurate Flannel Bag Co., 150 W. 22nd St., New York 11, N. Y.
Accurate Molding Corp., 35-20——48th Ave., Long Island City 1, N. Y.
Accurate Packaging, Inc., 120 John St., Brooklyn 1, N. Y.
Ace Box Co., 2950 Arkins Court, Denver 5, Colo.
•Ace Carton Corp., 5800 W. 51st St., Chicago 38, Ill.
Ace Folding Box Corp., White Pigeon, Mich.
Ace-National Paper Box Co., 837 S. Central Ave., Los Angeles 21, Calif.
Acheson Dispersed Pigments Co., 2250 E. Ontario St., Philadelphia 34, Pa.
Ackermann, G. A., Printing Co., 1320 S. 54th Ave., Cicero 50, Ill.
•Acme Backing Corp., Canal & Ludlow Sts., Stamford, Conn.
Acme Cellophane Converting Corp., 1701 S. Central Ave., Los Angeles 21, Calif.
Acme Folding Box Co., 200 Lynch St., St. Louis 18, Mo.
Acme Folding Box Co., Inc., 149 E. 25th St., New York 10, N. Y.
•Acme Gravure Services, Inc., 1501 W. Congress St., Chicago 7, Ill.
Acme Packaging Service, 122 W. Kinzie St., Chicago 10, Ill.
Acme Pallet Co., Inc., 15 Park Row, New York 38, N. Y.
Acme Paper Box Co., 800 Tennessee St., San Francisco 7, Calif.
Acme Paper Co., 444 Drumm St., San Francisco 11, Calif.
Acme Partition Co., 474 Mulberry St., Newark, N. J.
Acme Printing Ink Co., 1419-43 W. Carroll Ave., Chicago 7, Ill.
Acme Staple Co., 1643 Haddon Ave., Camden 3, N. J.
•Acme Steel Co., 2840 Archer Ave., Chicago 8, Ill.
Acorn Corrugated Box Co., 2268 S. Lumber St., Chicago 16, Ill.
Acro Tool & Die Works, 4554 Broadway, Chicago 40, Ill.
Acrolite Products, Inc., 108 Ashland Ave., West Orange, N. J.
Acryvin Corp. of America, 454 E. 99th St., Brooklyn, N. Y.
Action Bag & Envelope Co., Inc., 667 Atkins Ave., Brooklyn 8, N. Y.
Ad Art Statuary Co., 11406 Euclid Ave., Cleveland 6, Ohio
Adams, Eugene C., Associates, 1617 W. Madison St., Maywood, Ill.
Adams, Theo., 111 W. Washington St., Chicago 2, Ill.
Add-A-Handle Carton Co., 1065 Argyle St., Chicago 40, Ill.
Addison Lithographic Corp., 2 Elton St., Rochester 7, N. Y.
Addison-Semmes Corp., 1800 Thurston Ave., Racine, Wis.
Addressograph-Multigraph Corp., 1200 Babbitt Road, Cleveland 17, Ohio
Adhesive Products Corp., 1660 Boone Ave., New York 60, N. Y.
Adhesive Products, Inc., The, 520 East Shore Highway, Albany 10, Calif.
Adhesive Tape Products Co., 160 Fifth Ave., New York 10, N. Y.
Adhesives Manufacturers Assn. of America, 441 Lexington Ave., New York, N. Y.
Adjustomatic Packaging Machine Co., 1392 Niagara St., Buffalo 13, N. Y.
Adkins & Adkins, Sanford, Fla.
Admat Co., Crichton Station, Mobile, Ala.
Ad-Pro, 514 Main St., Cincinnati 2, Ohio
Ad-Stik Co., 5850 Centre Ave., Pittsburgh 6, Pa.
Ad Vac Plastics Corp., 217 W. 10th St., Indianapolis 2, Ind.
Advance Coatings Co., Depot Road, Westminster, Mass.
Advance Molding Corp., 54 W. 21st St., New York 10, N. Y.
Advance Manufacturing Co., 609 Rogers Ave., Brooklyn 25, N. Y.
Advance Mounting & Die Cutting Co., Inc., 445 W. 31st St., New York 1, N. Y.
Advance Packaging Co., Inc., 8931 S. State St., Chicago 19, Ill.
Advance Paper Box Co., 1900 W. 62nd St., Los Angeles 47, Calif.
Advertising Aides, 112 E. 19th St., New York 3, N. Y.
Advertising Distributors of America, Inc., 400 Madison Ave., New York 17, N. Y.
Advertising Federation of America, 330 W. 42nd St., New York, N. Y.
Advertising Metal Display Co., 4620 W. 19th St., Chicago 50, Ill.
Advertising Research Foundation, 11 W. 42nd St., New York, N. Y.
Aerated Container Corp., 39 S. LaSalle St., Chicago 3, Ill.
Aerocide Dispensers Ltd., Bethridge Rd., P.O. Box 9, Weston, Toronto, Canada
Aeroil Products Co., Inc., 69 Wesley St., So. Hackensack, N. J.
Aerol Co., Inc., 1731 Workman St., Los Angeles 31, Calif.
Aeropak, Inc., 3005 W. 47th St., Chicago 32, Ill.
Aerosol Process Co., 212 Grove St., Bridgeport 5, Conn.
Aerosol Research Co., 743 Circle Ave., Forest Park, Ill.
Ahrend Associates, Inc., 254 W. 54th St., New York 19, N. Y.
Ainslie Co., The, E-304——2nd Ave., Spokane 3, Wash.
Air-Pack Corp., 2045 Violet St., Los Angeles 21, Calif.
Air Transport Assn. of America, 1107——16th St., N.W., Washington 6, D. C.
Airlectron, Inc., 110 Washington St., New York 6, N. Y.
Ajax Box Co., The, 2210 S. Union Ave., Chicago 16, Ill.
Akers, Charles E., 600 W. Jackson Blvd., Chicago 6, Ill.
Akron Equipment Co., The, Box 831, Akron 9, Ohio
Aladdin Products Co., 26-04 Borough Place, Woodside 77, N. Y.
Alcott Associates, 291 Washington St., Islington, Mass.
Al-Craft Display Co., 12 E. 18th St., New York 3, N. Y.
Alden Plastic Corp., 230 Fifth Ave., New York 1, N. Y.
Alderman Paper Box Corp., 31 Exchange St., Rochester 14, N. Y.
Aldine Paper Co., Inc., 535 Fifth Ave., New York 17, N. Y.
Alemite Div., Stewart-Warner Corp., 1826 Diversey Parkway, Chicago 14, Ill.
Alford Cartons, Div. Continental Paper Co., Industrial Ave., Ridgefield Park, N. J.
Algene Marking Equipment Co., 232 Palisade Ave., Garfield, N. J.
Alko, Al, 216-30——114th Ave., Jamaica 11, N. Y.
Allbright-Nell Co., The, 5323 S. Western Blvd., Chicago 9, Ill.
Allcolor Co., Inc., 527 Fifth Ave., New York 17, N. Y.
Allcraft Container Corp., 405 Kingsland Ave., Harrison, N. J.
Allegheny Steel Band Co., P. O. Box 716, Pittsburgh 30, Pa.
Allied Commodities Co., 5601 W. Lake St., Minneapolis 16, Minn.
Allied Container Corp., 1715 Hyde Park Ave., Hyde Park 36, Mass.
Allied Display Materials, Inc., 65 Madison Ave., New York 16, N. Y.
Allied Paper Bag Corp., Bayard & Carroll Sts., Baltimore 29, Md.
Allis-Chalmers Mfg. Co., 1124 S. 70th St., Milwaukee 1, Wis.
Alsten Co., The, 715 Broadway, New York 3, N. Y.
Altair Machinery Corp., 55 Vandam St., New York 13, N. Y.
Alton Boxmakers, Inc., 812 Olive St., St. Louis 1, Mo.
Alufoil Products Co., Inc., 15 Ferry St., New York 38, N. Y.
Aluminum Assn., The, 420 Lexington Ave., New York 17, N. Y.
Aluminum Co. of America, 1501 Alcoa Bldg., Pittsburgh 19, Pa.
Aluminum Foil Packaging Co., 1800——33rd St., Fort Madison, Iowa.
•Aluminum Foils, Inc., P. O. Box 540, Jackson, Tenn.

Aluminum Products Corp., 551 W. Third St., Fulton, N. Y.
Aluminum Rolling Mills Ltd., Boulevard St. Laurent, Cap-de-la-Madeleine, Que., Canada
Alvey Conveyor Mfg. Co., 9301 Olive St. Road, St. Louis 24, Mo.
Ambassador Plastics & Mfg. Corp., 620 N. Michigan Ave., Chicago 11, Ill.
American Adhesive Mfg. Co., Inc., 13th St. & 3rd Ave., Brooklyn 15, N. Y.
American Aerosol Corp., 689 Gordon St., Holland, Mich.
American Aluminum Ware Co., 368 Jelliff Ave., Newark 8, N. J.
American Anode, Div. The B. F. Goodrich Co., 60 Cherry St., Akron 8, Ohio
American Associates Mfg. Corp., Bridge St., Deep River, Conn.
•American Bag & Paper Corp., Water & South Sts., Philadelphia 47, Pa.
American Basket Corp., 28 W. 27th St., New York 1, N. Y.
American Box Board Co., 470 Market St., Grand Rapids 2, Mich.
American Box Co., The, Sub. American Wood Products Corp., 1914 W. 3rd St., Cleveland 13, Ohio
American Can Co., 100 Park Ave., New York 17, N. Y.
American Carton Wrapper Co., 540 N. Lake Shore Drive, Chicago 11, Ill.
•American Cellubox Corp., 27-01 Bridge Plaza N., Long Island City 1, N. Y.
American Chemical Society, 1155—16th St., N.W., Washington 6, D. C.
American Coating Mills Div., Robert Gair Co., Inc., 228 N. LaSalle St., Chicago 1, Ill.
American Colortype Co., 1151 Roscoe St., Chicago 13, Ill.
American Cooperage Co., 500 Washington Ave., Milltown, N. J.
American Cordage & Paper Corp., 355-361 W. 36th St., New York 18, N. Y.
American Cork Specialties Co., Inc., 140 Junius St., Brooklyn 12, N. Y.
American Corrugated Paper Products Corp., 213-227 W. 26th St., New York 1, N. Y.
•American Cyanamid Co., Plastics & Resins Div., 30 Rockefeller Plaza, New York 20, N. Y.
American Decalcomania Co., Inc., 4344 W. Fifth Ave., Chicago 24, Ill.
American Die & Box Co., 999 S. Logan St., Denver 9, Colo.
American Drug Manufacturers Assn., Albee Bldg., Washington, D. C.
•American Excelsior Corp., 1000 N. Halsted St., Chicago 22, Ill.
American Fabricated Products Co., 1420 E. 20th St., Indianapolis 7, Ind.
•American Flange & Mfg. Co., Inc., 30 Rockefeller Plaza, New York 20, N. Y.
American Instrument Co., Inc., Silver Spring, Md.
American Kleer-Vu Plastics, Inc., 53-06 Grand Ave., Maspeth 78, L. I., N. Y.
American Lace Paper Co., 4425 N. Port Washington Ave., Milwaukee 12, Wis.
American Machine & Foundry Co., 261 Madison Ave., New York 16, N. Y.
American Machine Works, Inc., 1320 Clark St., Racine, Wis.
American Management Assn., 330 W. 42nd St., New York 36, N. Y.
American Marketing Assn., School of Business, Indiana University, Bloomington, Ind.
American Marking Corp., 77 Lock St., Newark 4, N. J.
American Meat Institute, 59 E. Van Buren St., Chicago, Ill.
American MerriLei Corp., 918 Halsey St., Brooklyn 33, N. Y.
American Metal Products Co., Inc., Burr Court, Bridgeport 5, Conn.
American Molding Powder & Chemical Corp., 703 Bedford Ave., Brooklyn 6, N. Y.
American National Bag & Burlap Co., Inc., 343-349 Kent Ave., Brooklyn 11, N. Y.
American Nickeloid Co., Second St., Peru, Ill.
American Pan Div., The, 720 Pearl St., Cincinnati 2, Ohio
American Paper Goods Co., The, Kensington, Conn.
American Partition Co., 3043 N. 30th St., Milwaukee 10, Wis.
American Perforator Co., The, 625 W. Jackson Blvd., Chicago 6, Ill.
American Plastic Products, 2907 S. Main St., Los Angeles 7, Calif.
American Potash & Chemical Corp., 3030 W. Sixth St., Los Angeles 54, Calif.
American Printing Ink Co., Div. Sun Chemical Corp., 1201 W. Washington Blvd., Chicago 7, Ill.
American Products Mfg. Co., Inc., 8127-33 Oleander St., New Orleans 18, La.
American Pulp & Paper Mill Superintendents Assn., The, 327 S. LaSalle St., Chicago 4, Ill.
American Rack Merchandisers Institute, 10-149 Merchandise Mart, Chicago 54, Ill.
American Resin Corp., 3215 N. Sheffield St., Chicago 13, Ill.
American Resinous Chemicals Corp., 103 Foster St., Peabody, Mass.
American Sealcone Corp., 1911 Park Ave., New York 35, N. Y.
American Seal-Kap Corp., 11-05—44th Drive, Long Island City 1, N. Y.
American Shredded Paper Co., 20 Vernon St., Somerville 45, Mass.
American Sisalkraft Corp., 55 Starkey St., Attleboro, Mass.
American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa.
American Specialty Co., The, Franklin Ave., Amherst, Ohio
American Standards Assn., 70 E. 45th St., New York 17, N. Y.
American Star Cork Co., Inc., 175 N. Ninth St., Brooklyn 11, N. Y.
American Tag Co., 151 Cortlandt St., Belleville 9, N. J.
American Tape Printer Co., 678 Sixth Ave., New York 10, N. Y.
American Tool Works Co., The, Pearl & Eggleston Sts., Cincinnati 2, Ohio
American Tri-State Paper Box Co., 808—17th Ave., N., Nashville 4, Tenn.
•American Type Founders, Inc., 200 Elmora Ave., Elizabeth B, N. J.
American Veneer Package Assn., Inc., 1225½ N. Orange Ave., Orlando, Fla.
•American Viscose Corp., AVISCO Film Div., 1617 Pennsylvania Blvd., Philadelphia 3, Pa.
American Wood Products Corp., Box 681, Marion, S. C.
Ames Bag Co., 2350 Selma Ave., Selma, Ala.
Ames Harris Neville Co., 2800—17th St., San Francisco 10, Calif.
Ames Safety Envelope Co., 21 Vine St., Somerville, Mass.
Amos Molded Plastics, S. Kyle St., Edinburg, Ind.
Ampoule Machine Co., 38-09—24th St., Long Island City 1, N. Y.
Ams, Max, Machine Co., Scofield Ave., Bridgeport 5, Conn.
•Amsco Packaging Machinery, Inc., 31-31—48th Ave., Long Island City 1, N. Y.
•Anchor Hocking Glass Corp., 20 Glass Ave., Lancaster, Ohio
•Anchor Plastics Co., Inc., 36-36—36th St., Long Island City 6, N. Y.
Andersen, A. J., Co., 429 W. Superior St., Chicago 10, Ill.
Anderson Box & Basket Co., Inc., 801 Mill St., Henderson, Ky.
Anderson Bros. Mfg. Co., 1907 Kishwaukee St., Rockford, Ill.
Anderson, George W., Inc., 36-02—38th St., Long Island City 1, N. Y.
Anderson, Milton, Co., 461 W. 23rd St., New York 11, N. Y.
Anderson, Ralph, 310 Pine St., Green Bay, Wis.
Andre Paper Box Co., 1355 Market St., San Francisco 3, Calif.
Andrews, O. B., Co., Sub. of Container Corp. of America, P. O. Box 431, Chattanooga, Tenn.
•Andrews, P. L., Corp., 1328 Broadway, New York 1, N. Y.
Angell Manufacturing Co., 1071 E. Monument Ave., Dayton 1, Ohio
Angelus Sanitary Can Machine Co., 4900 Pacific Blvd., Los Angeles 58, Calif.
•Angier Corp., Fountain St., Framingham, Mass.
•Angier Products, Inc., 120 Potter St., Cambridge 42, Mass.
Anigraphic Process, Inc., 237 Main St., Cliffside Park, N. J.
•Animal Trap Co. of America, Lititz, Pa.
Anorgana G.M.B.H., Gendorf/Obb. (13b), Western Germany
Anthony, S. A., Jr., 475 Fifth Ave., New York 17, N. Y.
•Apex Machine Co., 14-13—118th St., College Point 56, N. Y.
Apex Paper Box Corp., 311 W. Superior St., Chicago 10, Ill.
Applicator Co., The, 157—13th St., Brooklyn 15, N. Y.
Applicolor, Inc., 1501 S. Laflin St., Chicago 8, Ill.
Applied Engineering Associates, 1952 Flushing Ave., Brooklyn 37, N. Y.
Apsco, Inc., 79-81 Midland Ave., Garfield, N. J.
•Arabol Mfg. Co., 110 E. 42nd St., New York 17, N. Y.
Aravel Corp., 45 W. 34th St., New York 1, N. Y.
Arbetter Ribbon & Mfg. Co., 3816 Montrose Ave., Chicago 18, Ill.
Arbib, Richard, Co., Inc., 80 W. 40th St., New York 18, N. Y.
Archer Label Co., 783 Kohler St., Los Angeles 21, Calif.
Arcon Leather Products Mfg. Co., 29 W. 26th St., New York 10, N. Y.
•Arenco Machine Co., Inc., 25 W. 43rd St., New York 36, N. Y.
Arens, Egmont, 480 Lexington Ave., New York 17, N. Y.
Arkadia Label Corp., 126 W. 22nd St., New York 11, N. Y.
Arkell Safety Bag Co., 10 E. 40th St., New York 16, N. Y.
Arkell & Smiths, Mill St., Canajoharie, N. Y.
Arliss Co., Inc., Premier Plastics Div., 369 DeKalb Ave., Brooklyn 5, N. Y.
Armbrust Paper Tubes, Inc., 4351 W. Roosevelt St., Chicago 24, Ill.
Armour & Co., 1355 W. 31st St., Chicago 9, Ill.
Armour & Co., Curled Hair Div., No. Benton Road, Alliance, Ohio
•Armstrong Cork Co., Lancaster, Pa.
Armstrong Laboratory, 421 LaGrange St., West Roxbury 32, Mass.
Arner Co., Inc., The, 291-303 Michigan Ave., Buffalo 3, N. Y.
Arnkurt Associate Engineers, 31 E. 27th St., New York 16, N. Y.
Arrow Fastener Co., Inc., 1 Junius St., Brooklyn 12, N. Y.
•Arrow Mfg. Co., Inc., 567—52nd St., West New York, N. J.
Arrow Plastics Corp., 1 Mattimore St., Passaic, N. J.
Art Decorating Co., 4201 Hudson Blvd., No. Bergen, N. J.
Art Tube Co., Inc., 500 Lyon Ave., Irvington 11, N. J.

Artcote Papers, Inc., 390 Coit St., Irvington 11, N. J.
Artcraft Paper Box Co., 8103 Beach St., Los Angeles 1, Calif.
Artex Plastic Products, Inc., 11 Frankfort St. New York 38, N. Y.
Artistic Flower Co., Inc., 24 E. 21st St., New York 10, N. Y.
Artistic Paper Box Co., Inc., 134 Spring St., New York 12, N. Y.
Arundel Coating Corp., 1511 Guilford Ave., Baltimore 2, Md.
•Arvey Corp., 3500 N. Kimball Ave., Chicago 18, Ill.
Ashtabula Corrugated Box Co., The, 3714 Ann Ave., Ashtabula, Ohio
Askania Regulator Co., 240 E. Ontario St., Chicago 11, Ill.
Associated Box Corp., 812 N. Cedar St., New Castle, Pa.
Associated Brands, Inc., 35 Claver Place, Brooklyn 38, N. Y.
Associated Cooperage Industries of America, Inc., 408 Olive St., St. Louis 2, Mo.
Associated Designers, 664 N. Michigan Ave., Chicago 11, Ill.
Associated Folding Box Co., 240-250 Canal St., Lawrence, Mass.
Associated Machines, Inc., 203 N. Columbus St., Lancaster, Ohio
Associated Plastic Companies, Inc., 400 E. Hines St., Midland, Mich.
Assn. of American Railroads, Freight Claim Div., 59 E. Van Buren St., Chicago 5, Ill.
•Assn. of Creative Artists, Inc., 438 W. 37th St., New York, N. Y.
Aster Flower Co., 11 W. 37th St., New York 18, N. Y.
Atco Boxes, Inc., 1331 Halsey St., Brooklyn 27, N. Y.
Athol Paper Box Mfg. Co., 349 Main St., Athol, Mass.
Atlanta Film Converting Co., 1132 Pryor St. S.W., Atlanta, Ga.
Atlanta Paper Co., 950 W. Marietta St., N.W., Atlanta 2, Ga.
•Atlantic Can Co., 300 Park Ave., Delawanna, N. J.
Atlantic Carton Corp., N. Main & 2nd Sts., Norwich, Conn.
Atlantic Coffee Bag Co., Inc., 220 Kosciusko St., Brooklyn 16, N. Y.
Atlantic Container Corp., 48-08——30th Place, Long Island City 1, N. Y.
Atlantic Glass Co., 924 Greenmount Ave., Baltimore 2, Md.
Atlantic Gummed Paper Corp., 1 Main St., Brooklyn 1, N. Y.
Atlantic Mfg. Co., 557 Belmont Ave., Newark 8, N. J.
Atlantic Paper Box Co., 46 Waltham St., Boston 18, Mass.
Atlantic Plastics, Inc., 60 Bonner St., Stamford, Conn.
Atlantic Powdered Metals, Inc., 38 Park Row, New York 38, N. Y.
Atlantic Refining Co., 260 Broad St., Philadelphia, Pa.
Atlantic Transparent Box Co., 46 Waltham St., Boston 18, Mass.
•Atlas-Boxmakers, Inc., 5025 W. 65th St., Chicago 38, Ill.
Atlas Paper Box Co., Inc., 1300 Central Ave., Chattanooga, Tenn.
Atlas Plywood Corp., 1432 Statler Bldg., Boston 16, Mass.
Atlas Powder Co., Stamford, Conn.
Atlas Roll Leaf Corp., 405 Lexington Ave., New York 17, N. Y.
Atlas Stamp Co., The, 3201 Mahoning Ave., Youngstown, Ohio
Atmosphere Control Co., Inc., 5315 Chester Ave., Philadelphia 43, Pa.
Attleboro Printing & Embossing Co., Inc., 54 Union St., Attleboro, Mass.
•Auburn Button Works, Inc., 48 Canoga St., Auburn, N. Y.
Austin Industries, Inc., 133 E. Main St., Marlboro, Mass.
Austin O., 250 Dover St., Brooklyn 35, N. Y.
Auto Wrappers (Norwich) Ltd., Edward St., Norwich, England
Autokraft Box Corp., R. D. #3, York, Pa.
Automatic Packaging Co., 1830 W. Slauson Ave., Los Angeles 47, Calif.
Automatic Scale Co., Inc., 585-591 Hudson St., New York 14, N. Y.
Automatic Screw Products Co., 6818 W. Lake St., Minneapolis, Minn.
Automatic Transportation Co., 101 W. 87th St., Chicago 20, Ill.
Automatic Web Control Mfg. Co., P. O. Box 878, Oklahoma City, Okla.
Auto-Pack Co., P. O. Box 504, Jeffersonville, Ind.
Autopack Limited, Caroline St., Birmingham 3, England
Autotron Co., The, 128 W. Main St., Danville, Ill.
Auto-Vac Co., 1984 State Street Extension, Bridgeport, Conn.
Avalon Paper Box Co., Inc., 8723 Avalon Blvd., Los Angeles 3, Calif.
Averil of Florida, Inc., 3538 N.W. 54th St., Miami 42, Fla.
Avery Adhesive Label Corp., 1616 S. California Ave., Monrovia, Calif.
Avery Paper Co., 250 Chester St., Painesville, Ohio
Ayers & Grimshaw Ltd., Barnstable, Devon, England
Ayres, Jr., Samuel, Associates, 711 Boylston St., Boston 16, Mass.

B

B-B Shipping Room Supply Co., 564 W. Randolph St., Chicago 6, Ill.
B & D Bag Tying Machine Co., 60 Fulda St., Roxbury 19, Mass.
B-F-D Division, The Diamond Match Co., 122 E. 42nd St., New York, N. Y.
Babbitt Chemical Co., 38 Prospect St., New Bedford, Mass.
Babcock Box Co., Inc., 43 S. Main St., Attleboro, Mass.
Babson-Dow Manufacturing Co., 60 Fulda St., Boston 19, Mass.
Bach, Oscar B., 610 Fifth Ave., New York, N. Y.
Bach, Russell H., 4026 N. Wilson Drive, Milwaukee, Wis.
Bagcraft Corp. of America, 4501 S. Kildare Ave., Chicago 32, Ill.
Bag-O-Matic Div., Century Engineering Co., Inc., 5837-39 So. Talman Ave., Chicago 29, Ill.
Bagphane Corp., 65 S. 11th St., Brooklyn 11, N. Y.
Bagprint Machinery Corp., Sub. Valley Iron Works Co., 401 E. So. Island St., Appleton, Wis.
Bailey, R. N., & Co., Inc., 11 W. 42nd St., New York 36, N. Y.
Baird, C. D., & Co., 2100 W. Pierce St., Milwaukee 46, Wis.
•Bakelite Company, Div. Union Carbide & Carbon Corp., 30 E. 42nd St., New York 17, N. Y.
Baker-Rauling Co., The, 1250 W. 80th St., Cleveland 2, Ohio
•Baldwin-Lima-Hamilton Corp., 545 N. Third St., Hamilton, Ohio
•Ball Brothers Co., Inc., 1509 South Macedonia Ave., Muncie, Ind.
Balster, Wilmer J., 3511 Sheffield Ave., Chicago 13, Ill.
Baltimore Metal Products, Inc., 55 North 4th St., Brooklyn 11, N. Y.
Bamberger, A., Corp., 703 Bedford Ave., Brooklyn 6, N. Y.
Banever, Gilbert, 101 Park Ave., New York 17, N. Y.
Banka-Mango Design, 543 W. Diversey St., Chicago 14, Ill.
Barber Associates, Middle Beach, Madison, Conn.
Barber-Greene Co., 400 N. Highland Ave., Aurora, Ill.
Bardes, A. G., Co., Inc., 437 N. Fifth St., Milwaukee 3, Wis.
Bareco Oil Co., P. O. Box 2009, Tulsa 2, Okla.
Barger Box & Printing Corp., 802 W. Beardsley Ave., Elkhardt, Ind.
Barkley & Dexter, Inc., 50 Frankport St., Fitchburg, Mass.
Barnes, W. F. & John, Co.——Process Equipment Div., 301 S. Water St., Rockford, Ill.
Barnett, Samuel, Co., 22nd & Lehigh Ave., Philadelphia 32, Pa.
Barr, G., & Co., 3601 S. Racine Ave., Chicago 9, Ill.
Barraclough, R. W., Ltd., Manchester Road, Southport, Lancs., England
Barrett-Cravens Co., 4613 S. Western Blvd., Chicago 9, Ill.
Barrett Div., Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y.
Barry-Wehmiller Machinery Co., 4660 W. Florissant St., St. Louis 15, Mo.
•Bartelt Engineering Co., 1900 Harrison Ave., Rockford, Ill.
Bartgis Bros. Co., The, P. O. Box 249, Catonsville 28, Md.
Bartlett, F. P., & Co., Inc., 152 Sixth St., Cambridge 42, Mass.
Bartlett Label Co., 2135 Portage St., Kalamazoo 29F, Mich.
Basca Mfg. Co., Div. of Huyler's, 2222 N. Olney St., Indianapolis 18, Ind.
Basic Material Supply Co., Inc., 27 William St., New York 5, N. Y.
Bates Mfg. The, Orange, N. J.
Batson, James A., Electronics, Inc., 1031 S. 27th St., Omaha, Neb.
•Battle Creek Packaging Machines, Inc., Battle Creek, Mich.
Bauer & Black, Div. of The Kendall Co., 309 W. Jackson Blvd., Chicago 6, Ill.
Bauer, Litzy R., 153-30——78th Ave., Flushing 67, N. Y.
Bauer, Robert E., Co., 1134 Land Title Bldg., Philadelphia 10, Pa.
Bay Cities Paperbox Co., 646 Kennedy St., Oakland, Calif.
Bay Displays, 15 California St., San Francisco 11, Calif.
Bay Products, Inc., 3001 N. 16th St., Philadelphia 32, Pa.
Beacon Packing Corp., 242 S. First St., Brooklyn 11, N. Y.
Beacon Paper Bag Co., Inc., 37 Midland Ave., East Paterson, N. J.
Beall, Lester, 60 Sutton Place, S., New York, N. Y.
Beaman Plastics, 1702 N. E. Sandy Blvd., Portland 14, Ore.
Beasley, French & Co., Inc., 110 E. 31 St., New York 16, N. Y.
Beatty, Edward W., Studios, 900 Merchandise Mart, Chicago 54, Ill.
Bechtold, C. B., Co., 920 Levick St., Philadelphia 11, Pa.
•Beck, Charles, Machine Corp., Church & Gulph Roads, King of Prussia, Pa.
Beck, Clifford A., & Son, 482 West Broadway, New York 12, N. Y.
Beck Engraving Co., Inc., 105 S. 7th St., Philadelphia 6, Pa.
Becker & Becker Assoc., 509 Madison Ave., New York 22, N. Y.
Beggs & Graham, 200-208 Chancellor St., Philadelphia 6, Pa.
Behr-Manning Corp., 156 Howe St., Troy, N. Y.
Beier & Co., 409 S. Green St., Chicago 7, Ill.
Belding Corticelli Industries, Inc., 1407 Broadway, New York 18, N. Y.
Bell Box Co., 468 West Broadway, New York 12, N. Y.

Bell, Edwin, Cooperage Co., S. 17th St., Pittsburgh 3, Pa.
•Bell Machine Co., Oshkosh, Wis.
Bellamy, J. B., & Co., 2440 3rd St., San Francisco 7, Calif.
Bellen Co., 1612 W. North Ave., Chicago 22, Ill.
Belsaw Machinery Co., 315 Westport Road, Kansas City 11, Mo.
Bemis Bro. Bag Co., 111-H N. Fourth St., St. Louis 2, Mo.
Bemiss-Jason Co., Bay Road at Douglas, Redwood City, Calif.
Bendix Printing Co., Inc., 480 Canal St., New York 13, N. Y.
Benner Box, Inc., P. O. Box 193—Int'l Airport, Miami, Fla.
Bennett Industries, Inc., Washington St., Peotone, Ill.
Bennett, Paul, Paper Boxes, Inc., 121-129 Loomis St., Rockford, Ill.
•Bensing Bros. & Deeney, 3301 Hunting Park Ave., Philadelphia 29, Pa.
Berger, Alan, 67 Irving Place, New York 3, N. Y.
Berger & Gorin, Inc., 151 W. 26th St., New York 1, N. Y.
Berkander, George F., Inc., 891 Broad St., Providence 7, R. I.
Berkowitz, Leon L., Co., 1343 Arch St., Philadelphia 7, Pa.
•Berles Carton Co., Inc., 86 Fifth Ave., Paterson 4, N. J.
Berlin & Jones Co., Inc., 601 W. 26th St., New York 1, N. Y.
Berman Bros., Inc., 1501 S. Laflin St., Chicago 8, Ill.
Bernardin Bottle Cap Co., Inc., Evansville, Ind.
Bernard's Laboratories, 2619 Colerain Ave., Cincinnati 14, Ohio
Bernhard, Lucian, Studio, 122 E. 55th St., New York 22, N. Y.
Bernhard, M., Corp., 749 Monroe Ave., Rochester 2, N. Y.
Berni, Alan, & Associates, Inc., 7 E. 44th St., New York 17, N. Y.
Best Paper Box Co., Inc., The, 2021-33 W. Willow St., Chicago 47, Ill.
Bestpak, Inc., Bigelow Ave., Natick, Mass.
Bethlehem Steel Co., Bethlehem, Pa.
Better Bags, Inc., 2601-21 North Howard St., Philadelphia 33, Pa.
Better Packages, Inc., 252 Canal St., Shelton, Conn.
Bettis, H., Co., Box 151, Zanesville, Ohio
Bevan, William W., Co., Inc., 68 Vine St. Everett 49, Mass.
Beyer, Dick, 18 E. 41st St., New York 17, N. Y.
Bicknell & Fuller Paper Box Co., 50 Chardon St., Boston 16, Mass.
Bielefeld Studios, Inc., 35 E. Wacker Drive, Chicago 1, Ill.
Big Joe Mfg. Co., Inc., 900 W. Jackson Blvd., Chicago 7, Ill.
Bigelow-Garvey Lumber Co., 325 W. Huron St., Chicago 10, Ill.
Biltmore Box & Packaging Products Co., 1145 W. 14th Place, Chicago 8, Ill.
Bin-Dicator Co., The, 13946 Kercheval Ave., Detroit 15, Mich.
•Biner-Ellison Machinery Co., 1101 N. Main St., Los Angeles 12, Calif.
Binghamton Container Co., Inc., 28 Crandall St., Binghamton, N. Y.
Bird & Son, Inc., East Walpole, Mass.
Birmingham Paper Co., 2110 S. 5th Ave., Birmingham 3, Ala.
Biro Assoc., 270 Park Ave., New York, N. Y.
Bischoff Chemical Corp., Main St., Ivoryton, Conn.
Bishop, William, Co., 2449 N. Naomi St., Burbank, Calif.
Bisler, G. A., Inc., 5th & Brown Sts., Philadelphia 23, Pa.
•Bivans, E. L., Inc., 2431 Dallas St., Los Angeles 31, Calif.
•Black-Clawson Co., The Dilts Machine Works Div., 46 N. First St., Fulton, N. Y.
Black Products Co., 13513 Calumet Ave., Chicago 27, Ill.
Blake, Moffitt & Towne, 599 Eighth St., San Francisco 3, Calif.
Blank, Arthur, & Co., Inc., 38 Causeway St., Boston 14, Mass.
•Bleier, Milton A., Corp., 230 Fifth Ave., New York 1, N. Y.
Bleyer, Alfred, & Co., Inc., 58-77—57th St., Maspeth 78, N. Y.
Bliss, E. W., Co., 1375 Raff Road, S.W., Canton 10, Ohio
•Blocksom & Co., 5th & Canal Sts., Michigan City, Ind.
Bloomer Bros Co., Newark, N. Y.
Blossom Mfg. Co., 915 Broadway, New York 10, N. Y.
Blue Grass Cooperage Co., Highland Park, Louisville, Ky.
Blum Folding Paper Box Co., Inc., Valley Stream, N. Y.
Blumenthal, Margaret M., 10 W. 93rd St., New York 25, N. Y.
Boas, M. G., & Son, 2636 Shields Ave., Chicago 16, Ill.
Bobst, J., & Fils S. A., Lausanne 15, Switzerland
Bodinson Manufacturing Co., 2401 Bayshore Blvd., San Francisco 24, Calif.
Bodolay, Stephen, Inc., 77 Warehouse St., Springfield 8, Mass.
Bogert & Hopper, Inc., 101 W. 31st St., New York 1, N. Y.
Bohn Lumber Products, Inc., 24660 Schoenherr St., East Detroit, Mich.
Boice Folding Box Co., 4234 Ogden St., Philadelphia 4, Pa.
•Boler Petroleum Co., Inc., 121 S. Broad St., Philadelphia 7, Pa.
Bolta Products, Div. The General Tire & Rubber Co., 70 Garden St., Lawrence, Mass.
Bond Adhesives Co., 537 Johnson Ave., Brooklyn 37, N. Y.
Bonder Glass & Closure Co., 37 Bogart St., Brooklyn 6, N. Y.
Bonny Box Co., Inc., 202 E. 19th St., New York 3, N. Y.
Boone Box Co., 1700 Seventh St., Louisville 8, Ky.
Boonton Molding Co., 326 Myrtle Ave., Boonton, N. J.
Borden Co., The, Chemical Div., 350 Madison Ave., New York 17, N. Y.
Boren Industrial Designers, Edgeboro Drive, Newtown, Pa.
Borkland Laboratories, Marion, Ind.
Borkland Manufacturing Co., Marion, Ind.
•Bostitch, Westerly, R. I.
Boston Envelope Co., 297 High St., Dedham, Mass.
Boston Packaging Machinery Co., Inc., 215 Turnpike St., Canton, Mass.
Bostwick Laboratories, Inc., 706 Bostwick Ave., Bridgeport 5, Conn.
Bourbon Cooperage Co., Box #186, Campbellsville, Ky.
Bowaters Sales Co. Ltd., Bowater House, Stratton St., London, W1., England
Bowley, Peter D., & Associates, 210 Mississippi St., San Francisco 7, Calif.
Bowser-Morner Testing Laboratories, P. O. Box 51, Dayton, Ohio
Box Shop, Inc., The, 373 Lexington Ave., New Haven 13, Conn.
Boxcraft Paper Box Co., 1207 Kirkham St., Oakland 7, Calif.
Bracamonte, R. M., & Co., 160 Spear St., San Francisco 5, Calif.
Bracy & Bracy, 1030 Euclid Ave., Cleveland 15, Ohio
Braden Sutphin Ink Co., 3800 Chester Ave., Cleveland 14, Ohio
Bradford Novelty Co., Inc., 760 Main St., Cambridge 39, Mass.
Bradford, W. J., Paper Co., 3742 S. Ashland Ave., Chicago 9, Ill.
•Bradley Associates, Inc., 1650-1658 N. Damen Ave., Chicago 47, Ill.
•Bradley Container Corp., Thompson St., Maynard, Mass.
Bradley & Gilbert Co., The, Seventh & Magazine Sts., Louisville 1, Ky.
Bradley & Vrooman Co., 2629 S. Dearborn St., Chicago 16, Ill.
Bradner Smith & Co., 333 S. Desplaines St., Chicago 6, Ill.
Brady Conveyors Corp., The, 20 W. Jackson Blvd., Chicago 4, Ill.
Brady, W. H., Co., 727 W. Glendale Ave., Milwaukee 12, Wis.
Brainard Steel Div., Sharon Steel Corp., Griswold St., Warren, Ohio
Brand, R. A., & Co., Ltd., Holland St., Manchester, England
Brand, Ruth, 1414 Millwood Lane, No. Merrick, L. I., N. Y.
Brandau Craig Dickerson Co., 304 Tenth Ave., S., Nashville 3, Tenn.
Brandwell Sales Corp., 40-42 E. 19th St., New York 3, N. Y.
Brauer, Fred J., 125 E. 57th St., New York 22, N. Y.
Braun-Crystal Mfg. Co., Inc., 69-01 Metropolitan Ave., Middle Village 79, N. Y.
Braun-Hobar Corp., 2526 N. 32nd St., Milwaukee 10, Wis.
Braun, W., Co., 300 N. Canal St., Chicago 6, Ill.
Brecknell, Dolman & Rogers, Ltd., Pennywell Road, Bristol 5, England
Breetwor, I. N., & Associates, 4005 Wilshire Blvd., Los Angeles 5, Calif.
Brett Lithographing Co., 47-07 Pearson Place, Long Island City 1, N. Y.
Brewer & Kriet, 6245 S. Princeton Ave., Chicago 28, Ill.
Brice, John & Earline, Design Studios, 300 E. 57th St., New York, N. Y.
Brick & Ballerstein, Inc., 5-22—46th Ave., Long Island City 1, N. Y.
Bridgeport Brass Co., 30 Grand St., Bridgeport 2, Conn.
Bridgeport Moulded Products, Inc., 75 King's Highway Cut Off, Fairfield, Conn.
Bridgeport Paper Box Co., 304 Kossuth St., Bridgeport 1, Conn.
Brilhart Plastics Sales Corp., Old Country Road, Mineola, L. I., N. Y.
Brilmayer, E. W., Laboratories, Inc., 86 Fulton St., New York 38, N. Y.
Brimaur Pottery, Elizabethtown, N. Y.
Briscoe Box Mfg. Co., 650 N. Delaware Ave., Camden, N. J.
Bristol Co., The, Waterbury 20, Conn.
Bristol Paper Box Co., Inc., 1305 W. State St., Bristol, Va.
British Cellophane Ltd., 121-13 Conduit St., London, W.1, England
Brockton Mfg. Co., Inc., 367 Main St., Brockton, Mass.
Brockway Glass Co., Inc., Wood St., Brockway, Pa.
Bro-Dart Industries, ABCO Plastic & Supply Co. Div., 59 E. Alpine St., Newark 5, N. J.
Brooks Co., Inc., 140 Wilbraham Ave., Springfield 9, Mass.
Brooks-Loester Corp., 12-14 Spruce St., New York 38, N. Y.
Brooks Paper Co., 400 Security Bldg., St. Louis 2, Mo.
•Brooks & Porter, Inc., 304 Hudson St., New York 13, N. Y.
Brown Bag Filling Machine Co., Inc., Duck Mill Road, Fitchburg, Mass.
Brown & Bailey Co., 417 N. Eighth St., Philadelphia 23, Pa.
Brown-Bridge Mills, Inc., E. Water St., Troy, Ohio
Brown Co., 150 Causeway St., Boston 14, Mass.
Brown Container Co., Inc., P. O. Box 967, West Monroe, La.
Brownville Board Co., Inc., Brownville, N. Y.
Bruce Carton Co., 546 Weakley Ave., Memphis 7, Tenn.

Bryant, Jerry, Studios, 919 N. Michigan Ave., Chicago 11, Ill.
Buck Glass Co., Fort Ave. & Lawrence St., Baltimore 30, Md.
Buckeye Molding Co., 213 S. Third St., Miamisburg, Ohio
Buda Division, Allis-Chalmers Mfg. Co., 154th & Commercial Ave., Harvey, Ill.
Buedingen, W. John, 434 Browncroft Blvd., Rochester 9, N. Y.
Buedingen, William, & Son, Inc., 1500 Clinton Ave., N., Rochester 21, N. Y.
Buffalo Weaving & Belting Co., 260 Chandler St., Buffalo 7, N. Y.
Buffet, Gordon, Co., Inc., 897 Washington St., Boston 11, Mass.
Buffinton Made-Rite Box Co., 134 Thurbers Ave., Providence 3, R. I.
Bulkley, Dunton & Co., Inc., 295 Madison Ave., New York 17, N. Y.
Bulldog Pallet Co., Haley Rd., P. O. Box 547, Newark, Calif.
Bulman, E. O., Mfg. Co., Inc., The, 1705-1725 Elizabeth, N.W., Grand Rapids 2, Mich.
Bunn, B. H., Co., 7605 Vincennes Ave., Chicago 20, Ill.
Bunn Packaging Machinery Co., 7602 S. Greenwood Ave., Chicago 19, Ill.
Burd & Fletcher Co., 321 W. Seventh St., Kansas City 5, Mo.
•Burdick & Son, Inc., 72 Hamilton St., Albany 1, N. Y.
Bureau of Industrial Chemical Research, 424 Pitt St., W., Windsor, Ont., Canada
Burgess Fastening Co., 1220 W. Ninth St., Cleveland 13, Ohio
Burgess & Why Corp., 4045 Ridge Ave., Philadelphia 29, Pa.
Burkart, F., Mfg. Co., Div. Textron, Inc., 4900 N. Second St., St. Louis 7, Mo.
Burlington Mills Corp., Ribbon Div., 26 W. 40th St., New York, N. Y.
Burnett, R. L., Co., 815-817 E. Commerce St., San Antonio 6, Texas
Burros Bag Co., Inc., 135 Plymouth St., Brooklyn 1, N. Y.
Burt, F. L., Co., 571 Seventh St., San Francisco 3, Calif.
•Burt, F. N., Co., Inc., 514 Seneca St., Buffalo 4, N. Y.
Burt Machine Co., 401-03 E. Oliver St., Baltimore 2, Md.
Burton Packaging Co., 268 Fourth Ave., New York 10, N. Y.
Busch, V. W., Mfg. Co., Rushton Rd., South Lyon, Mich.
Buschman, E. W., Co., The, 4497 Clifton Ave., Cincinnati 32, Ohio
Buser, R. G., Silk Corp., 28 Ryle Ave., Paterson 20, N. J.
Butler & Ferrigno Lithographic Co., 5223 Belfield Ave., Philadelphia 44, Pa.
Butler Paper Products Co., The, 982 Wall St., Toledo 10, Ohio
•Butterfield-Barry Co., Inc., The, 800 Huyler St., Teterboro, N. J.
Butterfield, T. F., Inc., 56 Rubber Ave., Naugatuck, Conn.
Button Corp. of America, 49 Dickerson St., Newark 3, N. J.

C

C.L.C. Machinery Co., 196 Grant Ave., Hamilton, Ont., Canada
C & M Manufacturing Co., 112 Point St., Providence, R. I.
COSECO, 1300 S. Santa Fe Ave., Los Angeles 21, Calif.
CPS Mfg. Co., 4801 S. Western Blvd., Chicago 9, Ill.
C.T.C. Industries, Inc., 2nd & Beckett St., Camden 3, N. J.
Cabot, Petra, 2 Fifth Ave., New York, N. Y.
Cadillac Label Co., 221 W. Butler St., Kalamazoo, Mich.
Cadillac Products, Inc., 2302 Gainsboro Ave., Ferndale 20, Mich.
•Cady, E. J., & Co., 630 N. Harlem Ave., River Forest, Ill.
Cahill, J. D., Co., P. O. Box 229, Haverhill, Mass.
California Container Corp., Div. Container Corp. of America, 5008 S. Boyle Ave., Los Angeles 58, Calif.
California Ink Co., 545 Sansome St., San Francisco, Calif.
Calig Steel Drum Co., 27 Tecumset St., Pittsburgh 7, Pa.
Callahan, J. A., Co., 118 S. Clinton St., Chicago 6, Ill.
Calmar Co., 6800 McKinley Ave., Los Angeles 1, Calif.
Calumet Carton Co., 18212 Harwood Ave., Homewood, Ill.
Calumet Mfg. Co., Inc., 565 Fifth Ave., New York 17, N. Y.
Calvert Lithographing Co., The, 2100 Grand River Ave., Detroit 1, Mich.
Cambridge Industries Co., 101 Potter St., Cambridge 42, Mass.
Cambridge Instrument Co., Inc., 3804 Grand Central Terminal, New York 17, N. Y.
Cambridge Paper Box Co., 196 Broadway, Cambridge 39, Mass.
•Cameo Die & Label Co., 154 W. 14th St., New York 11, N. Y.
Cameron Can Machinery Co., 240 N. Ashland Ave., Chicago 7, Ill.
Cameron Machine Co., 61 Poplar St., Brooklyn 1, N. Y.
Camotone, Inc., 313 Halstead Ave., Mamaroneck, N. Y.
Camp Manufacturing Co., Franklin, Va.
Campbell Box & Tag Co., 903 S. Main St., South Bend 23, Ind.
Campco Div., Chicago Molded Products Corp., 2717 N. Normandy Ave., Chicago 35, Ill.
Can Manufacturers Institute, 1037 Shoreham Bldg., Washington, D. C.; 60 E. 42nd St., New York 17, N. Y.
Canada Foils, Ltd., 1891 Eglinton Ave., E., Toronto, Ont., Canada
Canada Glazed Papers Limited, 2131 Lawrence Ave., E., Wexford P. O., Ont., Canada
Canada Paper "Wholesale" Ltd., 21 Wellington St., W., Toronto 1, Ont., Canada
Canadian Industries Ltd., P. O. Box 10, Montreal, Que., Canada.
Canfield, M. E., Co., 419 E. Third St., Los Angeles 13, Calif.
Canning Machinery & Supplies Assn., 4630 Montgomery Ave., Washington 14, D. C.
Can Pro Corp., 19 E. McWilliams St., Fond du Lac, Wis.
Cans, Inc., 3217 W. 47th Place, Chicago 32, Ill.
Canton Containers, Inc., 1101 Ninth St., S.E., Canton 7, Ohio
Cantor Press, Inc., 311 N. Desplaines St., Chicago 6, Ill.
Capital City Container Co., Inc., Tivoli St., Albany 4, N. Y.
Capitol Folding Paper Box Co., Inc., 25-25 Borden Ave., Long Island City, N. Y.
•Capitol Packaging Co., 1441 Circle St., Forest Park, Ill.
Carbert Mfg. Co., Inc., 144 Moody St., Waltham 54, Mass.
Carbona Products Co., 30-50 Greenpoint Ave., Long Island City 1, N. Y.
Cardel Enterprises Ltd., Queen Elizabeth Blvd. at Royal York Road, Toronto 14, Ont., Canada
Cardinal Boxes, Inc., 410 N. Franklin St., Philadelphia 23, Pa.
Cardinal Flower & Novelty Co., 37 E. 19th St., New York 3, N. Y.
Cardinal Lithograph Co., 2875 W. 9th St., Los Angeles 6, Calif.
Cardinal Mills, Inc., Glen Cove, N. Y.
Cargo Packers, Inc., 3720—14th Ave., Brooklyn 18, N. Y.
•Cargo Packers Special Products Co., 3720—14th Ave., Brooklyn 18, N. Y.
Carlee Plastics, Inc., 1653 E. Florence Ave., Los Angeles 1, Calif.
Carlisle, A., & Co., 645 Harrison St., San Francisco 7, Calif.
Carlson, John P., Inc., 420 Carroll St., Brooklyn 15, N. Y.
Carlyle Container Co., 624 Pecan Ave., Charlotte, N. C.
Carolina Paper Board Corp., Gardner Ave., Charlotte, N. C.
Carpenter Container Corp., Lindenhurst, N. Y.
Carr-Lowrey Glass Co., 2201 Kloman St., Baltimore 30, Md.
Carter Engineering Co., 123 N. Hazel St., Danville, Ill.
Carter & Galantin of Illinois, Inc., 105 W. Monroe St., Chicago 3, Ill.
Carter, Joseph, 4855 W. Berenice Ave., Chicago 41, Ill.
Carton Craftsmen, Inc., 813 N. Franklin St., Chicago 10, Ill.
Carton Label & Lithograph Co., 200 Broadway, San Francisco 11, Calif.
Carton Service, Inc., Franklin Ave., Shelby, Ohio
Casco Paper Box Co., 68 Cross St., Portland 3, Maine
Casler, Arvid, 1174 Webster Lane, Des Plaines, Ill.
Casselman, T. & E., Inc., 356 W. 18th St., New York 11, N. Y.
Casting Masters, Inc., 2640 Wilcox St., Chicago 12, Ill.
Catalin Corp. of America, One Park Ave., New York 16, N. Y.
Catty, H. D., Corp., 160 Varick St., New York 13, N. Y.
Cayne, Albert H., Equipment Corp., 71A Spring St., New York 12, N. Y.
•Celanese Corp. of America, 180 Madison Ave., New York 16, N. Y.
Cello Bag Co., 4550—38th Ave., S.W., Seattle 6, Wash.
Cello-Masters, Inc., 1155 Randall Ave., New York 59, N. Y.
Cello-Pack Co., 641 Bailey Ave., Buffalo 6, N. Y.
Cellophane Bag & Printing Corp., 754 Lexington Ave., Brooklyn 21, N. Y.
Cellotape Printers, 3225 Ash St., Palo Alto, Calif.
•Cellu-Craft Products Corp., 1401 Fourth Ave., New Hyde Park, N. Y.
Celluplastic Corp., 50 Ave. L, Newark 5, N. J.
Cellusuede Products, Inc., 516 N. Madison St., Rockford, Ill.
•Celon Co., The, 2030 Pennsylvania Ave., Madison 4, Wis.
Celotex Corp., The, 120 S. LaSalle St., Chicago 3, Ill.
Celwa Products Co., 840 Broadway, New York 3, N. Y.
•Cenpro Corp., The, 1739 Harding Road, Northfield, Ill.
Center Tool & Mfg. Co., Inc., 2706 W. Van Buren St., Chicago 12, Ill.
Central Carton Co., The, 920 Summer St., Cincinnati 4, Ohio
Central Design & Development Co., 65 Flatbush Ave., Brooklyn 17, N. Y.
Central Fibre Products Co., 901 S. Front St., Quincy, Ill.
Central Lithograph Co., The, 113 St. Clair Ave., N.E., Cleveland 14, Ohio
Central Ohio Paper Co., The, 226 N. Fifth St., Columbus 16, Ohio
Central Paper Box Co., 225 E. Grant St., Lancaster, Pa.
Central Paper Co., 622 Manitowoc St., Menasha, Wis.
Central Paper Co., Inc., 2400 Lakeshore Drive, Muskegon, Mich.
Central Plastic Corp., Central St., Leominster, Mass.

Central States Can Corp., The, Hapsh Ave., S. E., Massillon, Ohio
Central States Paper & Bag Co., 5221 Natural Bridge Ave., St. Louis 20, Mo.
Central Supply Co., P. O. Box 797, Milwaukee, Wis.
Central Waxed Paper Co., 5100 W. Roosevelt Road, Chicago 50, Ill.
Central Wire Frame Co., 218 E. 26th St., New York 10, N. Y.
Century Engineering Co., 5837 S. Talman St., Chicago 29, Ill.
Ceragraphic, Inc., 250 South St., Newark 5, N. J.
Ceramic Decorating Co., 4651 Sheila St., Los Angeles 22, Calif.
Cesco (Columbia Engineering Service Co.) 4025 Sebastopol Rd., Santa Rosa, Calif.
Chaffee Brothers Co., Main St., Oxford, Mass.
Chaffee, Ralph, & Co., 2358-2360 Market St., San Francisco 14, Calif.
Chain Belt Co., 4760 W. Greenfield Ave., Milwaukee 1, Wis.
Chambers-Storck Co., Inc., The, 751 N. Main St., Norwich, Conn.
Champion Bag Co., 160 N. Loomis St., Chicago 7, Ill.
Champion Container Co., 980 N. Delaware Ave., Philadelphia 23, Pa.
Champion-International Co., 38 Prospect St., Lawrence, Mass.
•Champion Paper & Fibre Co., The, 601 North B St., Hamilton, Ohio
•Champlain Co., Inc., 88 Llewellyn Ave., Bloomfield, N. J.
Chanal Plastics Corp., 361 Stagg St., Brooklyn 6, N. Y.
Chandler Mfg. Co., Inc., The, 103 Old Colony Ave., E. Taunton, Mass.
Chandler & Price Co., The, 6000 Carnegie Ave., Cleveland 3, Ohio
Chapman, Dave, 420 N. Michigan Ave., Chicago 11, Ill.
Chargar, Ruth, 299 Madison Ave., New York 17, N. Y.
Chase Bag Co., 309 W. Jackson Blvd., Chicago 6, Ill.
Chase Equipment Corp., 47 E. 19th St., New York 3, N. Y.
Chase Products Co., 20th & Gardner Rd., Broadview, Ill.
•Chaspec Manufacturing Co., The, 342 W. Putnam Ave., Greenwich, Conn.
Chem-Pak, Inc., 408 Blade Ave., Cincinnati 16, Ohio
Chem-Products, Inc., 94 Silas Deane Hgwy, Rocky Hill, Conn.
Chemical Color & Supply Co., Div. Sun Chemical Corp., 2820 W. Grand Ave., Chicago 12, Ill.
Chemical Paper Mfg. Co., Foot of Jackson St., Holyoke, Mass.
Chemical & Power Products, Inc., 11 Broadway, New York 4, N. Y.
Chemical Specialties Manufacturers Assn., Inc., 50 E. 41st St., New York, N. Y.
Chemi-Form Corp., 3707 W. Harrison St., Chicago, Ill.
Chesapeake Corp. of Va., The, West Point, Va.
Cheslam Corp., 684 Nepperhan Ave., Yonkers 2, N. Y.
Chess & Wymond Co., 421 W. Avery, Louisville, Ky.
•Chester Packaging Products Corp., 684 Nepperhan Ave., Yonkers 2, N. Y.
Chicago Cardboard Co., 1240 N. Homan Ave., Chicago 53, Ill.
•Chicago Carton Co., 4200 S. Crawford Ave., Chicago 32, Ill.
Chicago Mailing Tube Co., 1040 Vernon Park Place, Chicago 7, Ill.
Chicago Mill & Lumber Co., 33 S. Clark St., Chicago 3, Ill.
Chicago Paper Co., 801 S. Wells St., Chicago 7, Ill.
Chicago Printed String Co., 2300 Logan Blvd., Chicago 47, Ill.
Chicago Show Printing Co., 2635 N. Kildare Ave., Chicago 39, Ill.
Chicopee Mills, Inc., 47 Worth St., New York 11, N. Y.
Chiltern Paper Products Ltd., Belswains Lake, Hemel Hempstead, England
Chinkes, Sam, & Assoc., 72 E. 167th St., Bronx 52, N. Y.
Chipman, Richmond Lane, Jr., 30-A North Mountain Ave., Montclair, N. J.
Chippewa Paper Products Co., Inc., 2425 S. Rockwell St., Chicago 8, Ill.
Chippewa Plastics, Inc., 210 E. Columbia St., Chippewa Falls, Wis.
Chirpe, W. Rodney, 185 N. Wabash Ave., Chicago, Ill.
Chisholm-Moore Hoist Div., Columbus McKinnon Chain Corp., Fremont Ave., Tonawanda, N. Y.
Chisholm-Ryder Co., Inc., College & Highland Ave., Niagara Falls, N. Y.
•Chisholm-Ryder Co. of Pa., 218 E. Chestnut St., Hanover, Pa.
Chromatic Displays, 4 N. 11th St., Philadelphia 7, Pa.
Cincinnati Industries, Inc., 316 Carthage Ave., Cincinnati 15, Ohio
Cincinnati Molding Co., 2037 Florence Ave., Cincinnati 6, Ohio
Cin-Made Corp., The, 800 E. Ross Ave., Cincinnati 17, Ohio
Cities Service Oil Co., 60 Wall Tower, New York 5, N. Y.
City Cooperage Co., P. O., Box 69, Canton, Ohio
Claremont Pigment Dispersion Corp., 110 Wallabout St., Brooklyn 11, N. Y.
•Claremont Waste Mfg. Co., 169 Main St., Claremont, N. H.
Claremould Plastics Co., 200 Wright St., Newark 5, N. J.
•Clark-Aiken Co., The, Lee, Mass.
Clark Equipment Co., 24th St., Battle Creek, Mich.
Clark-Franklin Press, 15 Hathaway St., Boston 10, Mass.
Clark, George P., Co., 28 Canal St., Windsor Locks, Conn.
Clark, J. L., Mfg. Co., 2300 Sixth St., Rockford, Ill.
Clark Stek-O Corp., 1631 Dewey Ave., Rochester 15, N. Y.
Clarke, Rene, 247 Park Ave., New York, N. Y.
Clarvan Corp., 250 N. Water St., Milwaukee 1, Wis.
Clay Printing Co., Inc., 500 Main Ave., N.W., Hickory, N. C.
Clayton Corp., 4205 Forest Park Blvd., St. Louis 8, Mo.
Clearco Products Co., 165 W. 26th St., New York 1, N. Y.
Clearprint, Inc., 3639 Dyre Ave., New York 66, N. Y.
Cleveland Aerosol Packaging Corp., 425 Lakeside Ave. W., Cleveland 13, Ohio
•Cleveland Container Co., The, 6201 Barberton Ave., Cleveland 2, Ohio
Cleveland Crane & Engineering Co., The, Wickcliffe, Ohio
Cleveland Lathe & Machine Co., 5400 Brookpark Road, Cleveland 29, Ohio
Cleveland Vibrator Co., The, 2828 Clinton Ave., Cleveland 13, Ohio
Clifton Paper Board Sales Co., 1 Ackerman Ave., Clifton, N. J.
Clifton Plastics Corp., 53 Orchard St., Clifton, N. J.
Climax Fibre Drum Co., Box 109, Carthage, N. Y.
Climax Mfg. Co., Castorland, N. Y.
Clinch-Tite Corp., 50 Fairfield St., Boston 16, Mass.
Clinwill Plastics, Inc., 701 Seneca St., Buffalo 10, N. Y.
Clogston Paper Box Co., The, 102 Hill St., New Haven 9, Conn.
•Clopay Corp., Clopay Square, Cincinnati 14, Ohio
Closegate Trading Co. Ltd., Shell House, 55 Bishopsgate, London, E.C.2, England
Closures, Inc., 50 State St., Waterbury, Conn.
Clover Plastic Contours, Inc., 20 Fitch St., East Norwalk, Conn.
•Clybourn Machine Corp., 6479 N. Avondale Ave., Chicago 31, Ill.
Coast Carton Co., 1990 Alaskan Way, Seattle 1, Wash.
Coast Custom Filling Co., 1085 N. Oxford Ave., Los Angeles 29, Calif.
Coated & Processed Paper Assn., 1002 Union Trust Bldg., Providence 3, R. I.
Coates Board & Carton Co., Inc., 70 Outwater Lane, Garfield, N. J.
Coating Products, Inc., 101 W. Forest St., Englewood, N. J.
Cobden Chadwick, Ltd., Century Works, Havelock St., Oldham, Lancs., England
•Cochran Foil Co., Inc., 1430 S. 13th St., Louisville 2, Ky.
Cochrane Chemical Co., Lloyd Road, Matawan, N. J.
Codd Paper Co., Inc., 420 Lexington Ave., New York 17, N. Y.
•Coddington, E. D., Mfg. Co., 5024 N. 37th St., Milwaukee 9, Wis.
Codie-Kay Co., Inc., 1139 San Julian St., Los Angeles 15, Calif.
Coe, W. H., Mfg. Co., Inc., 215 E. 149th St., New York 51, N. Y.
Coes, Loring, Co., 72 Coes St,. Worcester 3, Mass.
Coffman Mfg. Corp., Northwest Highway, Box 372, Cary, Ill.
Cohoes Carrybag Co., Inc., Cohoes, N. Y.
Colgate, Wm. Homer, P. O. Box 50, West Redding, Conn.
Collapsible Tube Manufacturers Assn., 19 W. 44th St., New York 36, N. Y.
Collett Sproule Boxes Ltd., 127 Portland St., Toronto 2B, Ont., Canada
Collier Mfg. Corp., Div. Warren Featherbone Co., Warren Square, Three Oaks, Mich.
Collison, Lee & Philippi, Inc., 6409 Beechmont Ave., Cincinnati 30, Ohio
Colonial Envelope Co., Inc., 24 E. 22nd St., New York 10, N. Y.
Colonial Label Co., 36 W. 15th St., New York 11, N. Y.
Color Research Institute, 176 W. Adams St., Chicago, Ill.
Colora Printing Inks, Inc., 23-12—38th Ave., Long Island City 1, N. Y.
Color-Craft Display Corp., 52-25 Barnett Ave., Long Island City 4, N. Y.
Colorcraft Screening Co., 508—42nd St., Union City, N. J.
Colson Corp., Cedar & Pine Sts., Elyria, Ohio
•Colton, Arthur, Co., 3400 E. Lafayette St., Detroit 7, Mich.
•Colt's Manufacturing Co., Van Dyke Ave., Hartford 15, Conn.
•Columbia Box Board Mills, Inc., Chatham, N. Y.
Columbia Can Co., 59-27—54th St., Maspeth 78, L. I., N. Y.
Columbia Engineering Service Co., 4025-37 Sebastopol Highway, Santa Rosa, Calif.
Columbia Paper Products Corp., 2335 W. Franklin St., Baltimore 23, Md.
Columbian Rope Co., 309 Genesee St., Auburn, N. Y.
Columbus Coated Fabrics Corp., Seventh & Grant Aves., Columbus 16, Ohio
Columbus Paper Box Co., Inc., 344 W. Town St., Columbus 22, Ohio
Columbus Plastic Products, Inc., 1625 W. Mound St., Columbus 23, Ohio
Comet Envelope & Paper Co., Inc., 5 E. 17th St., New York 3, N. Y.
•Comet Industries, 9865 Franklin Ave., Franklin Park, Ill.
Comet Packaging & Paper Co., Inc., 439 Fourth Ave., New York 16, N. Y.

Comly-Gillam Carton Corp., G & Lycoming Sts., Philadelphia 24, Pa.
Commerce Oil Corp., 515 Madison Ave., New York 22, N. Y.
Commercial Corrugated Container Corp., 236 W. 17th St., New York 11, N. Y.
Commercial Paste Co., The, 504-520 Buttles Ave., Columbus 8, Ohio
Commercial Plastics & Supply Corp., 630 Broadway, New York 12, N. Y.
Commonwealth Plastics Corp., 98 Adams St., Leominster, Mass.
Como Plastics, Inc., 1703 Keller Ave., Columbus, Ind.
Compass Paper & Box Co., 135 Bleecker St., New York 12, N. Y.
Conapac Machine Co., 120 E. 13th St., New York 3, N. Y.
Conart Co., Inc., The, 240 Glen Head Road, Glen Head, N. Y.
Concord Chemical Co., 80 E. Second St., Moorestown, N. J.
Condon, Frank, Assoc., Inc., Eaton's Neck, Northport, N. Y.
Congress Paper Box Co., 210 N. Wolcott Ave., Chicago 12, Ill.
Conneaut Can Co., The, Whitney Rd., Conneaut, Ohio
Connecticut Chemicals (Canada) Ltd., Curity Ave. & Hollinger Rd., Toronto, Ont., Canada
Connecticut Chemical Research Corp., 706 Bostwick Ave., Bridgeport 5, Conn.
Connecticut Plastic Products Co., 70 W. Liberty St., Waterbury, Conn.
Connolly, J. J., Inc., 457 W. 40th St., New York 18, N. Y.
Consolidated Bag Corp., 3435 Melvale St., Philadelphia 34, Pa.
Consolidated Box Co., Inc., 410 S. Packwood St., Tampa, Fla.
Consolidated Fruit Jar Co. of N. J., The, 62 Water St., New Brunswick, N. J.
Consolidated Lithograph Div., Somerville Ltd., 1800 Parthenais St., Montreal 24, Que., Canada
Consolidated Lithographing Corp., Carle Place P. O., L. I., N. Y.
Consolidated Molded Products Corp., 309 Cherry St., Scranton 2, Pa.
Consolidated Packaging Machinery Corp., 1400 West Ave., Buffalo 13, N. Y.
Consolidated Paper Box Co., 6 Vernon St., Somerville 45, Mass.
Consolidated Paper Co., E. Elm Ave., Monroe, Mich.
Consolidated Paper Co., Inc., 170 N. 11th St., Brooklyn 11, N. Y.
Consolidated Water Power & Paper Co., 800 Fremont St., Wisconsin Rapids, Wis.
Constructions Industrielles de Precision, 145 Ave. Du General Michel Bizot, Paris 12e, France
Consumer-Pak Machine Co., 1100 E. Second St., Pomona, Calif.
Consumers Glass Co. Ltd., Canada Cement Co. Bldg., Phillips Sq., Montreal, Que., Canada
Container Corp. of America, 38 S. Dearborn St., Chicago 3, Ill.
Container Corp. of America, Traver Flexible Packaging Div., 358 West Ontario St., Chicago 10, Ill.
•Container-Craft, Inc., 31 W. 21st St., New York 10, N. Y.
Container Equipment Corp., 78-88 Locust Ave., Bloomfield, N. J.
Container Handling, Inc., 654 Westlake Ave., Los Angeles, Calif.
Container Laboratories, Inc., 228 N. LaSalle St., Chicago, Ill.
Container Stapling Corp., Box 247, Herrin, Ill.
Continental Bag Specialties Corp., 10 Clifton Blvd., Clifton, N. J.
Continental Can Co., Crown & Cork Div., 205 W. 14th St., Wilmington 99, Del.
Continental Can Co., Fibre Drum Div., Van Wert, Ohio
Continental Can Co., Metal Div., 100 E. 42nd St., New York 17, N. Y.
•Continental Can Co., Millsplastic Div., 135 So. LaSalle St., Chicago 3, Ill.
Continental Can Co., Paper Container Div., 349 Oraton St., Newark 1, N. J.
•Continental Can Co., Shellmar-Betner Flexible Packaging Div., Mt. Vernon, Ohio
Continental Decalcomania Co., Averill Ave., Sparta, Mich.
Continental Elastic Co., 90 Hatch St., New Bedford, Mass.
Continental Filling Corp., 123 N. Hazel St., Danville, Ill.
Continental Folding Paper Box Co., Inc., Ridgefield, N. J.
Continental Gin Co., 4500 Fifth Ave., S., Birmingham 2, Ala.
Continental Glass Co., 841 W. Cermak Road, Chicago 8, Ill.
Continental Paper Co., Industrial Ave., Ridgefield Park, N. J.
Continental Paper Products Co., 1000 W. Louisiana Ave., Denver 9, Colo.
Continental Plastics Corp., 2934 W. Lake St., Chicago 12, Ill.
Contract Packers, Inc., 2331—12th Ave., New York 27, N. Y.
Converter Corp., 218 Willard St., Leominster, Mass.
Converters Ink Co., 1261 W. Elizabeth Ave., Linden, N. J.
Converters Machine Co., 22 W. Putnam Ave., Greenwich, Conn.
Conveyor Specialty Co., Inc., 33 Newport Ave., No. Quincy 71, Mass.
Conveyor Systems, Inc., 325 S. California Ave., Chicago 12, Ill.
Convoy, Inc., 3440 Navarre Road, S.W., Canton 6, Ohio
Cooper Carton Corp., 4343 S. Ashland Ave., Chicago 9, Ill.
Cooper, D. C., Co., 1467 S. Michigan Ave., Chicago 5, Ill.
Cooper Paper Box Corp., Sycamore & Mortimer Sts., Buffalo 4, N. Y.
Copeland Displays, Inc., 537 W. 53rd St., New York 19, N. Y.
Cormack, Robert B., 768 Ogden St., Denver, Colo.
Corn Belt Adhesives Co., 815—22nd Ave., Council Bluffs, Iowa
Cornelius, Theodore, 220 Broadway, New York 38, N. Y.
Cornell Paperboard Products Co., 1514 E. Thomas Ave., Milwaukee 1, Wis.
Corning Glass Works, Corning, N. Y.
Coronet Products Corp., 114-116 N. Franklin St., Philadelphia, Pa.
Corro Ltd., 799 Washington St., New York 14, N. Y.
Corro-Lith Corp., 44-35—21st St., Long Island City 1, N. Y.
Corson Mfg. Co., 20-24 Michigan St., Lockport, N. Y.
Coryngton Products Co., Div. of Shoup-Owens, 1100 Adams St., Hoboken, N. J.
Cotswold Fibers Co., 916 Eighth Ave., Columbus, Ga.
•Cottonluxe Mfg. Co., 781 E. 136th St., New York 54, N. Y.
Cottrell Co., Sub. Harris-Seybold Co., 86-120 Mechanic St., Westerly, R. I.
Coughlin Mfg. Co., 697-699 E. 132nd St., New York 54, N. Y.
•Counsel Machine Co., Inc., 8 Hathaway St., Wallington, N. J.
Couper, Don, Pound Ridge, Westchester County, N. Y.
Courier-Journal Lithographing Co., 324 W. Liberty St., Louisville 1, Ky.
Courtland Box Co., 596—15th Ave., Columbus, Ga.
Cowan, Elton T., Co., Inc., 133 W. 19th St., New York 11, N. Y.
Cowles, Harold A., Box & Display Co., 693 Portland Ave., Rochester 21, N. Y.
Coy, Disbrow & Co., Inc., 686-690 Greenwich St., New York 14, N. Y.
Cozier Container Corp., 446 E. 131st St., Cleveland 8, Ohio
Cozzoli Machine Co., 401 E. 3rd St., Plainfield, N. J.
Craftint Mfg. Co., 1615 Collamer Ave., Cleveland 10, Ohio
Craftsmen Machinery Co., 75 W. Dedham St., Boston, Mass.
Craftsmen Press, 5241 E. Washington St., Indianapolis 5, Ind.
Craig Machine, Inc., 90 Holten St., Danvers, Mass.
Crandall Can Filler Machine Co., 1392 Niagara St., Buffalo 13, N. Y.
Crandall, Inc., 315 N. Euclid Ave., Oak Park, Ill.
Crane, Susan, Gift Packaging, 1841 Levee St., Dallas, Texas
Crawford, E. A., Co., Box 216, Edgewood Station, Providence 5, R. I.
Crawford Engineering Inc., 254 Aborn St., Providence 3, R. I.
Crawford Industries, Inc., W. First at Darr, Oil City, Pa.
•Crawford, John W., Co., 160 Varick St., New York 13, N. Y.
Creative Moulded Products Co., 434 Sixth Ave., New York 11, N. Y.
Creators Art Service, 110 W. 40th St., New York 18, N. Y.
Crescent Box Corp., Erie Ave. & E St., Philadelphia 34, Pa.
Crescent Burlap Bag Co., 4124 Toulouse St., New Orleans 27, La.
Crescent Ink & Color Co. of Pa., 464 N. Fifth St., Philadelphia 23, Pa.
Crescent Machine Works, 5959 Colorado Blvd., Denver 16, Colo.
Crescent Paper Tube Co., Inc., 120 E. Fourth St., Covington, Ky.
Crescent Truck Co., 1035 Willow St., Lebanon, Pa.
Criterion Paper Corp., 799 Washington St., New York 14, N. Y.
Croce, Isabel M., 50 Park Ave., New York 16, N. Y.
•Crocker, Burbank Papers, Inc., 545 Westminster St., Fitchburg, Mass.
•Crocker, H. S., Co., Inc., 1000 San Mateo Ave., San Bruno, Calif.
Crompton-Richmond Co., Inc., 1071 Ave. of the Americas, New York 18, N. Y.
Crompton Schoettle, Inc., 145 W. Columbia St., Philadelphia 22, Pa.
•Cromwell Paper Co., The, 4801 S. Whipple St., Chicago 32, Ill.
Crook Paper Box Co., 110 E. Tenth Ave., No. Kansas City, Mo.
Crook, William A., Co., 36 Pleasant St., Watertown 72, Mass.
•Cross Paper Products Corp., 4377 Bronx Blvd., New York 66, N. Y.
Crossett Paper Mills, Crossett, Ark.
Crowe Engineering Co., The, 1838 Western Ave., Cincinnati 14, Ohio
Crowell Carton Co., Industrial Road, Marshall, Mich.
Crown Color & Design Corp., 152 E. 26th St., New York 10, N. Y.
•Crown Cork & Seal Co., Inc., Eastern Ave., & Kresson St., Baltimore 24, Md.
•Crown Cork & Seal Co., Inc., Can Div., Ashton Road & Grant Ave., Philadelphia 36, Pa.
Crown Cork & Seal Co., Inc., Specialty Div., 5622 Natural Bridge Ave., St. Louis 15, Mo.
Crown Engineering & Sales Co., 421 Mill St., Harrison, N. J.
Crown Glass Corp., 600 W. Hubbard St., Chicago 10, Ill.
Crown Paper Board Co., Inc., Delaware Ave., & Tasker St., Philadelphia 48, Pa.
Crown Zellerbach Corp., Western Gummed Tape Div., 343 Sansome St., San Francisco 19, Calif.
Cruver Mfg. Co., 2460 W. Jackson Blvd., Chicago 12, Ill.
Cruze, Charles, 2340 W. Third St., Los Angeles 57, Calif.

Crystal Paper Box Co., Inc., 153-9 W. 27th St., New York 1, N. Y.
Crystal Tissue Co., The, Middletown, Ohio
Crystal Transparent Corp., 101 W. Forest Ave., Englewood, N. J.
Crystal Tube Corp., 6625 W. Diversey Ave., Chicago 35, Ill.
Crystal-X Corp., W. Lenni Road, Lenni Mills, Pa.
Culligan, Inc., Desiccant Div., Northbrook, Ill.
Cullom, W. F., 251 E. 35th St., New York 16, N. Y.
Cummins-Chicago Corp., 4740 N. Ravenswood, Chicago 40, Ill.
Cupples-Hesse Corp., 4100 Kingshighway N., St. Louis 15, Mo.
Cupples, Samuel, Envelope Co., Inc., 360 Furman St., Brooklyn 1, N. Y.
Curley Co., Inc., 1432 N. Randolph St., Philadelphia 22, Pa.
Curtis, S., & Son, Inc., Sandy Hook, Conn.
Curtiss-Wright Corp., Plastics Div., 831 Central Ave., Carlstadt, N. J.
Cushion Pack, Inc., 150 Fifth Ave., Hawthorne, N. J.
Cushman & Denison Mfg. Co., 153 W. 23rd St., New York 11, N. Y.
Custom-Made Paper Bag Co., Inc., 33rd St. & Skillman Ave., Long Island City 1, N. Y.
Custom Packaging, Inc., 136 Tichenor St., Newark 5, N. J.
Custom-Pak, Inc., 3810 Hires Lane, Cincinnati 12, Ohio
Cutler-Hammer, Inc., 315 N. 12th St., Milwaukee 1, Wis.
Cylinders, Inc., Main St., Grenloch, N. J.

D

D. C. Engineering Co. Ltd., The, Central Buildings, North St., Guildford, Surrey, England
D & D Plastics, Inc., 7599 E. Nine Mile Rd., Van Dyke, Mich.
Dacam Corp., 401 Gradner St., Charlotte, N. C.
D'Addario, Thomas, Studios, 24 E. 38th St., New York 36, N. Y.
Dade, Geo. C., Inc., Old Country Road, Mineola, L. I., N. Y.
Dadmun, Royal, & Associates, 1118 N. Calvert St., Baltimore 2, Md.
Daffin Mfg. Co., Keller Ave. & Fruitville Pike, Lancaster, Pa.
Daher Co., 338 Pearl St., New York 38, N. Y.
Dairy Whipt Corp., 39 S. LaSalle St., Chicago, Ill.
Dale, John, Ltd., 14 Brunswick Park Rd., London, N.11, England
Dallas Label & Box Co., 1504 Munger Ave., Dallas, Texas
Dalmas, Ltd., Junior St., Leicester, England
Danbury Square Box Co., The, Elmwood Place, Danbury, Conn.
Daniels Mfg. Co., 114 W. Kemp St., Rhinelander, Wis.
Danish Institute of Packaging, The, 3B Julius Thomsensgade, Copenhagen, Denmark
Dapol Plastics, Inc., 90 Grove St., Worcester 5, Mass.
Darby Paper Co., Providence Road, Lansdowne, Pa.
Darr, Harold W., Associates, 5 E. 22nd St., Minneapolis 4, Minn.
Datz Manufacturing Co., 537-41 N. Third St., Philadelphia 23, Pa.
Davidson Associates, 50 E. 42nd St., New York 17, N. Y.
Davidson-Hansen, Inc., 9 E. 48th St., New York 17, N. Y.
Davidson Products Co., 1166 Mercer St., Seattle 9, Wash.
Davies, Harry, Molding Co., 1428 N. Wells St., Chicago 10, Ill.
Davies, Helen, & Associates, 140 W. 57th St., New York 19, N. Y.
•Davis, Joseph, Plastics Co., 450 Schuyler Ave., Arlington, N. J.
Davis, L. D., Co., Inc., The, 1401 Walnut St., Philadelphia 2, Pa.
Davis, Orvil, Chatsworth Gardens, Larchmont, N. Y.
Davis, S. H., Paper Box Co., The, 1028 W. Central Ave., Toledo 6, Ohio
Davison Chemical Co., Div. W. R. Grace & Co., 101 N. Charles St., Baltimore 3, Md.
Day Mfg. Co., Inc., 219 S. Crockett St., Sherman, Texas
Dayton Embossed Products Corp., 400 Linden Ave., Dayton 3, Ohio
Dean, Charles C. S., 521 Fifth Ave., New York 17, N. Y.
Dearborn Chemical Co., Merchandise Mart Plaza, Chicago 54, Ill.
DeBell & Richardson, Inc., Water St., Hazardville, Conn.
Decal Plas-Stik Co., 333 Sixth Ave., New York 14, N. Y.
Dec-Art Process Co., Inc., 349 Canal Pl., New York 51, N. Y.
Decorating Process, Inc., Div. Fuld Bros., 702 S. Wolfe St., Baltimore 31, Md.
Decotone Products Div., Fitchburg Paper Co., 193 Kimball St., Fitchburg, Mass.
Deerfield Glassine Co., Main St., Monroe Bridge, Mass.
Deerfield Plastics Co., Inc., 271 Main St., So. Deerfield, Mass.
de Florez Co., Inc., The, 116 E. 30th St., New York 16, N. Y.
Deisroth, W. H., Co., Inc., 21st St. & Hunting Park Ave., Philadelphia 40, Pa.
Deitz, S. J., Co., 38 River Edge Road, River Edge, N. J.
Dejonge, Louis, & Co., 233 Broadway, New York 7, N. Y.
Delamere & Williams Co., Ltd., 18-32 Hook Ave., Toronto, Ont., Canada
Delaware Barrel & Drum Co., Inc., P. O. Box 1648, Wilmington, Del.
DeLine, I. A., Paper Boxes, Inc., 1162 Champa St., Denver 4, Colo.
Dellenbarger Machine Co., Inc., 379 West Broadway, New York 12, N. Y.
Delmar Paper Box Co., The, 419 W. Fifth St., Cincinnati 2, Ohio
Delta Paper Box Co., 939 E. Church St., Stockton, Calif.
De Luxe Craft Mfg. Co., 1579 Milwaukee Ave., Chicago 22, Ill.
De Mattia Machine & Tool Co., Chelsea Road, Clifton, N. J.
Demuth Glass Works, Inc., Parkersburg, W. Va.
DeNina, James Andrew, 475 Fifth Ave., New York 17, N. Y.
Dennis Chemical Co., 2701 Papin St., St. Louis 3, Mo.
Dennis, Gordon W., 2572 Webster St., Palo Alto, Calif.
•Dennison Mfg. Co., 300 Howard St., Framingham, Mass.
Denton Corp., The, 2124 Livingston St., Oakland 6, Calif.
•Dependable Compressor & Machine Co., 157 W. 21st St., New York 11, N. Y.
Derby Sealers, Inc., 575 Madison St., Derby, Conn.
Design Associates, Ltd., 1 E. 53rd St., New York, N. Y.
Design Development Associates, 45 Castle St., San Francisco 11, Calif.
Designeers, 53 Orchard St., Manhasset, N. Y.
Designers for Industry, Inc., 2915 Detroit Ave., Cleveland 13, Ohio
Deskey, Donald, Associates, 630 Fifth Ave., New York 20, N. Y.
Detecto Scales, Inc., 540 Park Ave., Brooklyn 5, N. Y.
Detroit Sulphite Pulp & Paper Co., 9125 W. Jefferson Ave., Detroit 17, Mich.
Detroit Testing Laboratory, Inc., 554 Bagley Ave., Detroit 26, Mich.
DeVilbiss Co., The, 300 Phillips Ave., Toledo 1, Ohio
Devon Products, Inc., 141 E. 44th St., New York 17, N. Y.
•Dewey & Almy Chemical Co., Div. W. R. Grace & Co., 62 Whittemore Ave., Cambridge 40, Mass.
Dewitz, J. Henry, 666 Lake Shore Drive, Chicago 11, Ill.
Dexter Folder Co., 330 W. 42nd St., New York 36, N. Y.
Dexter Paper Box Co., 2333 Valley St., Oakland 12, Calif.
Diagraph-Bradley Industries, Inc., P. O. Box 269, Herrin, Ill.
Diamond Match Co., The, 122 E. 42nd St., New York 17, N. Y.
Diamond Paper Box Co., 246 N. Delaware Ave., Philadelphia 6, Pa.
Diamond Straw & Machine Co., 32-36 W. 18th St., New York 11, N. Y.
Diaphane Corp., 1934 Arch St., Philadelphia 3, Pa.
Dickens, Robert Sidney, 908 N. Ernst Court, Chicago 11, Ill.
Dickinson Brothers, 146 N. Division Ave., Grand Rapids 2, Mich.
Dickinson, John, & Co., Ltd., Apsley Mills, Hemel Hempstead, Herts., England
Diemolding Corp., 125 Rasbach St., Canastota, N. Y.
Dikeman Laminating Corp., 181 Sargeant Ave., Clifton 2, N. J.
Dilatush, Edward, & Co., Robbinsville, N. J.
Dill Manufacturing Co., The, 700 E. 82nd St., Cleveland 3, Ohio
Dilts Machine Works, Div. Black-Clawson Co., 46 N. First St., Fulton, N. Y.
Direct Reproduction Corp., 811-813 Union St., Brooklyn 15, N. Y.
Disbrow Mfg. Co., 181 S. 18th St., East Orange, N. J.
Dispens-A-Label Devices, 203 Boggs Ave., Pittsburgh 11, Pa.
Dispensers, Inc., 947 E. 62nd St., Los Angeles 1, Calif.
Display Finishing Co., Inc., 21-16—44th Road, Long Island City 1, N. Y.
Display Guild, 85-09—57th Ave., Elmhurst, L. I., N. Y.
Dix, J. J., Inc., 211 W. 61st St., New York 23, N. Y.
Dixie Container Corp., 2000 Jefferson Davis Highway, Richmond 3, Va.
Dixie Cup Co., 24th & Dixie Ave., Easton, Pa.
Dixie Wax Paper Co., Box 5116, Dallas 22, Texas
DoAll Co., The, 254 N. Laurel Ave., Des Plaines, Ill.
•Dobeckmun Co., The, P. O. Box 6417, Cleveland 1, Ohio
Dodge Cork Co., Inc., Laurel & Manor Sts., Lancaster, Pa.
Dodge, E. F., Paper Box Corp., 142 Water St., Leominster, Mass.
Doherty, F. R., 2970 W. Grand Blvd., Detroit 2, Mich.
Dolphin Jute Mills, 7 Spruce St., Paterson, N. J.
Dominion Envelope Co., Ltd., 130-150 Duchess St., Toronto, Ont., Canada
Donahue, Ann, 51 W. Tenth St., New York 11, N. Y.
Donald Art Co., Inc., Donald Art Bldg., Mamaroneck, N. Y.
•Donrico, Inc., 438 W. 37th St., New York 18, N. Y.
Doran Brothers, Inc., Shelter Rock Road, Danbury, Conn.
Dorey Corrugated Paper Products, Inc., 37 Main St., Scottsville, N. Y.

Dorfman, A., Co., Inc., 57-59 W. 19th St., New York 11, N. Y.
Dornbusch & Co., Kalanderstrasse 19-25, Krefeld 22, Germany
•Doughboy Industries, Inc., New Richmond, Wis.
Douglas Chemical Co., 620 E. 16th St., North Kansas City, Mo.
Douglas, Charles E., & Co. Ltd., 86 Strand, London, W.C.2, England
Dow Chemical Co., The, Midland, Mich.
Dow Corning Corp., Midland, Mich.
Downingtown Paper Box Co., 324 Brandywine Ave., Downingtown, Pa.
Doyle, J. E., Co., The, 1220 W. Sixth St., Cleveland 13, Ohio
Dralle, Elizabeth M., 20 W. Eighth St., New York 11, N. Y.
Draper & Emerick, 164 Ridgewood Road, Pittsburgh 9, Pa.
Dreyer, H. D., & Co., Inc., Aliceanna & Spring Sts., Baltimore 31, Md.
Dreyfuss, Henry, 4 W. 58th St., New York, N. Y.
Driaire, Inc., 132 S. Main St., So. Norwalk, Conn.
Driscoll, Frank H., Co., Inc., The, 2218 N. Liberty St., Winston-Salem, N. C.
Driscoll, Martin, & Co., 610 S. Federal St., Chicago 5, Ill.
Driver, Geo., & Son Ltd., Abbeydale Road, Wembley, Middlesex, England
Drug Package, Inc., 2419 N. Glasgow Ave., St. Louis 6, Mo.
Drum Equipment Corp., 947 Lehigh Ave., Union, N. J.
Drum Parts, Inc., 10311 Meech Ave., Cleveland 5, Ohio
Dubelier Braid Co., 208 W. 27th St., New York 1, N. Y.
DuBois Plastic Products, Inc., 168-178 Florida St., Buffalo 8, N. Y.
Dubuque Container Co., Dubuque, Iowa
Dudley Corp., Airport, Hollister, Calif.
Duff California Co., 100 Bush St., San Francisco 4, Calif.
Dumatic Industries, 1443 N. 12th St., Philadelphia 22, Pa.
•Dumont Enterprises, Inc., 168 S. Van Brunt St., Englewood, N. J.
Dunbar, E. Helen, 530 E. 88th St., New York, N. Y.
Duncan Equipment Co., 506 Broadway, Seattle 22, Wash.
Dunmire Packaging Products Co., 1330 S. Gerhart Ave., Los Angeles 22, Calif.
Dunning, J. H., Corp., 265 Post Road, Darien, Conn.
Duo-Pak Containers Co., P. O. Box 232, Sausalito, Calif.
•du Pont de Nemours, E. I., & Co., Inc., Wilmington 98, Del.
Durable Plastics, Inc., Hi-Way 75 North, Sherman, Texas
Dura-Lee Corp., 908 Broadway, Kansas City 5, Mo.
Durethene Corp., 1859 S. 55th Ave., Chicago 50, Ill.
Durez Plastics & Chemicals, Inc., 1947 Walck Road, No. Tonawanda, N. Y.
Duro Envelope Co., 24 E. 22nd St., New York 10, N. Y.
•Dusenbery, John, Co., Inc., 271 Grove Ave., Verona, N. J.
Dusseau, Lambert, 10 E. 53rd St., New York 22, N. Y.
Dwinell, Charles L., 200 Merchandise Mart Bldg., Kansas City 8, Mo.
Dyn Corp., 1239 St. Nicholas Ave., New York 32, N. Y.

E

E & R Machine Co., Parker Road, Hamburg, N. Y.
Eagle Machinery Co. Ltd., 465 California St., San Francisco 4, Calif.
Eagle Paper Box Mfg. Co., Inc., 1755 N. Monitor Ave., Chicago 39, Ill.
Eagle Printing Ink Co., Div. Sun Chemicall Corp., 10th St. & 44th Ave., Long Island City 1, N. Y.
Earlville Paper Box Co., Inc., Clyde St., Earlville, N. Y.
East Coast Paper Products Corp., 90 Butler St., Brooklyn 31, N. Y.
East Texas Pulp & Paper Co., P. O. Box 816, Silsbee, Texas
Eastern Can Co., Wythe Ave. at Keap St., Brooklyn 11, N. Y.
Eastern Cellophane Co., 137-139 Pearl St., Boston 10, Mass.
Eastern Corrugated Container Corp., 227 Clifton Blvd., Clifton, N. J.
Eastern Display & Carton Corp., 447 Hickory St., Kearny, N. J.
Eastern Duo-Fast Corp., 145 Spring St., New York 12, N. Y.
Eastern Packaging Equipment Corp., 29-15 Bridge Plaza, N., Long Island City 1, N. Y.
Eastern Paper Box Co., 355 Central Ave., Newark 8, N. J.
Eastern Seaboard Plastics, Inc., 217 Astor St., Newark 5, N. J.
Eastern Wooden Box Assn., 80 Boylston St., Boston 16, Mass.
Eastman Chemical Products, Inc., Kingsport, Tenn.
•Eastman Kodak Co., 343 State St., Rochester 4, N. Y.
Eastman Tag & Label Co., 548 Fourth St., San Francisco 7, Calif.
Ebert Electronics Corp., 212-26 Jamaica Ave., Queens Village 28, N. Y.
Ebbert Engineering Co., Box 44, Birmingham, Mich.
Eckland, Everett B., 141 W. Jackson Blvd., Chicago, Ill.
Eclipse Plastic Industries, Inc., Box 430, Sarasota, Fla.
Econo Products, Inc., 132 Humboldt St., Rochester 10, N. Y.
•Economic Machinery Co., Div. Geo. J. Meyer Mfg. Co., 60 Fremont St., Worcester, Mass.
Economy Engineering Co., 4511 W. Lake St., Chicago 24, Ill.
Economy Novelty & Printing Co., 225 W. 39th St., New York 18, N. Y.
Eddy Paper Corp., The, 919 N. Michigan Ave., Chicago 11, Ill.
Edfin Packaging Machinery Corp., 306 E. 123rd St., New York 35, N. Y.
Edlaw Packaging Co., Inc., The, 88-61—76th Ave., Glendale 27, N. Y.
Edwards & Deutsch Lithographing Co., 2320 S. Wabash Ave., Chicago 16, Ill.
Edwards Folding Box Co., 27 N. Sixth St., Philadelphia 6, Pa.
Egan, Frank W., & Co., 36 S. Adamsville Rd., Somerville, N. J.
Ehrman, Ernst, 61 E. 66th St., New York 21, N. Y.
Einson-Freeman Co., Inc., Starr & Borden Aves., Long Island City 1, N. Y.
Ekco Products Co., 1949 N. Cicero Ave., Chicago 39, Ill.
Elberta Crate & Box Co., Lake Bradford Road, Tallahassee, Fla.
Eldon Manufacturing Co., 1010 E. 62nd St., Los Angeles 1, Calif.
Electric Eye Equipment Co., 1942 E. Fairchild St., Danville, Ill.
Electro-Technical Products, Div. Sun Chemical Corp., 113 E. Centre St., Nutley 10, N. J.
•Electronic Machine Parts, Inc., 204 Lafayette St., New York 1, N. Y.
Electronic Processes Corp., 1021 San Antonio Road, Los Altos, Calif.
Electronic Products Corp., 207 S. Green St., Chicago 7, Ill.
Electronic Wave Products, Inc., 15 E. 22nd St., New York 10, N. Y.
Elgin Co., 171 Madison Ave., New York 16, N. Y.
Elgin Manufacturing Co., 200 Brook St., Elgin, Ill.
Elizabeth Iron Works, Inc., Green Lane, Union, N. J.
Ellender, Raphael, 338 W. 72nd St., New York 23, N. Y.
Elliott Manufacturing Co., 1735 Ventura St., Fresno, Calif.
Ellis, C. H., Co., Inc., 134-140 S. Pennsylvania St., Indianapolis 4, Ind.
Ellis, George D., & Sons, Inc., American & Luzerne Sts., Philadelphia 40, Pa.
Elm Coated Fabrics Co., Inc., 48 W. 25th St., New York 10, N. Y.
Elm Press Co., Inc., The, 150 W. 22nd St., New York 11, N. Y.
Elray Packit Corp., 449 Central Ave., Newark 7, N. J.
Elwell-Parker Electric Co., The, 4109 St. Clair Ave., Cleveland 3, Ohio
Emeloid Co., Inc., The, 1239 Central Ave., Hillside 5, N. J.
Emerson Plastics Corp., 567 Third Ave., New York 16, N. Y.
Emery-Carpenter Container Co., 4600 Carew Tower, Cincinnati 1, Ohio
Emilius, J. A., Sons, 617 Fanshawe St., Philadelphia 11, Pa.
Emission Products Corp., 449 Central Ave., Newark 7, N. J.
Empire Box Corp., 17 E. Chestnut St., Chicago 11, Ill.
Empire Box, Inc., 627 Whitehall St., S.W., Atlanta, Ga.
Empire Can Corp., 228 Ashford St., Brooklyn 7, N. Y.
•Empire Specialty Envelope Co., Inc., 123 Schermerhorn St., Brooklyn 1, N. Y.
Endura Corp., 45 N. Fourth St., Quakertown, Pa.
Engineer Design Co., 66-70 Beaver St., New York 4, N. Y.
Enu-Matic Equipment Corp., 4630 Magnolia Blvd., Burbank, Calif.
Envelope Manufacturers Assn. of America, 521 Fifth Ave., New York 17, N. Y.
Ephraim & Co., 515 Ash St., Denver 20, Colo.
Eppler, John, Co., 1210 S. Sharp St., Baltimore 30, Md.
Epsen Lithographing Co., 2000 California St., Omaha, Neb.
Epstein Cooperage, 359 Frost St., Brooklyn, N. Y.
Equality Novelty Co., 104 W. 29th St., New York 1, N. Y.
Equipment Manufacturing, Inc., 21550 Hoover Road, Detroit 5, Mich.
•Equitable Paper Bag Co., Inc., 45-50 Van Dam St., Long Island City 1, N. Y.
Erie Resistor Corp., Plastics Div., 1345 W. 12th St., Erie, Pa.
Eriez Manufacturing Co., 221 State St., Erie, Pa.
•Erno Products Co., 65 N. Second St., Philadelphia 6, Pa.
Eronel Services, Inc., New Milford, Conn.
•Errich International Corp., 5 E. 35th St., New York 1, N. Y.
Ertel Engineering Corp., 8-14 N. Front St., Kingston, N. Y.
Erving Paper Mills, Erving, Mass.
Essex Paper Box Mfg. Co., Inc., 281-297 Astor St., Newark 5, N. J.
Estes, E. B., & Sons, 100 Fifth Ave., New York 11, N. Y.
Eston Chemicals, Inc., 3100 E. 26th St., Los Angeles, Calif.
Ettlinger, Louis, & Sons, 945 Richmond Ave., Staten Island 2, N. Y.
Eureka Manufacturing Co., Inc., 144 W. Britannia St., Taunton, Mass.
Eureka Paper Box Co., 401 E. Canal St., Williamsport 6, Pa.
Eureka Paper Box Co., Inc., 1940 Tarleton St., Los Angeles 11, Calif.
Eureka Specialty Printing Co., 530 Electric St., Scranton 9, Pa.
•Evans Chemetics, Inc., 250 E. 43rd St., New York 17, N. Y.

•Ever Ready Label Corp., 357 Cortlandt St., Belleville 9, N. J.
Eveready Pressurized Products, Inc., 1022 Belt Line St., Cleveland 9, Ohio
Everett Sales & Equipment Corp., 251 Third Ave., New York 10, N. Y.
Exact Weight Scale Co., The, 916 W. Fifth Ave., Columbus 8, Ohio
Excel Automatic Products, Inc., 59—12th Ave., Newark 8, N. J.
Ex-Cell-O Corp., Pure-Pak Div., 1200 Oakman Blvd., Detroit 32, Mich.
Excello Paper Products, 3351 Madison Road, Oakley, Cincinnati 9, Ohio
Excelsior Plimptruck Co., 796 Atlantic St., Stamford, Conn.
Exeter Paper Co., Inc., 730 N. Franklin St., Chicago 10, Ill.
•Extruded Plastics, Inc., New Canaan Ave., Norwalk, Conn.
•Extruders, Inc., 3232 W. El Segundo Blvd., Hawthorne, Calif.
Extrudo-Film Corp., 72 Greene St., New York, N. Y.
Eyelet Specialty Co., Inc., The, P. O. Box 711, Waterbury 20, Conn.
Eyrle Co., 1539 Folsom St., San Francisco 3, Calif.

F

Fabra Case Corp., 837 State St., Springfield 9, Mass.
Fab-Weld Corp., 3668 Richmond St., Philadelphia 34, Pa.
Factory Service Co., 4615 N. 21st St., Milwaukee 9, Wis.
Fairbairn Tape & Label Co., Inc., 1139 Howard St., San Francisco 3, Calif.
Fairbanks Co., The, 393 Lafayette St., New York 3, N. Y.
Fairchild's, Inc., 1327½ E. Colorado St., Glendale 5, Calif.
Fairest, Morgan, Ltd., Carlisle St., Sheffield 4, England
Fairfield Paper & Container Co., Baltimore, Ohio
Fairmont Glass Works, Inc., 1301 S. Keystone Ave., Indianapolis 7, Ind.
Falge Engineering Corp., 4733 Elm St., Bethesda 14, Md.
Farquhar, A. B., Co., 142 N. Duke St., York, Pa.
Farrell, Harry H., 220 S. Michigan Ave., Chicago 4, Ill.
Farrington Mfg. Co., 76 Atherton St., Boston 30, Mass.
Farrington Texol Corp., 2000 Main St., Walpole, Mass.
Fastener Corp., 860 Fletcher St., Chicago 14, Ill.
Fastex, Inc., P. O. Box 1759, Cleveland 5, Ohio
Feather-Mark Products Co., 173 Water St., New York 38, N. Y.
Feaver, John H., Paper Co., P. O. Box 400, Bala-Cynwyd, Pa.
Feder Industries, Inc., 509 W. 56th St., New York 19, N. Y.
•Federal Adhesives Corp., 210 Wythe Ave., Brooklyn 11, N. Y.
Federal Carton Corp., 2001 Tonnelle Ave., No. Bergen, N. J.
Federal Container Corp., 516 Second Ave., N., Minneapolis 3, Minn.
Federal Packaging Corp., 400 Madison Ave., New York 17, N. Y.
Federal Paper Board Co., Inc., 24 River Rd., Bogota, N. J.
Federal Paper Box Mfg. Co., 2349 N. 7th St., Philadelphia 33, Pa.
Federal Tin Co., Inc., Charles & Barre Sts., Baltimore 2, Md.
Federal Tool Corp., 3600 W. Pratt Blvd., Chicago 45, Ill.
Federico, Joseph B., 789 W. Ferry St., Buffalo 22, N. Y.
Feisner, D. C., Containers, 41 Lincoln Ave., Orange, N. J.
Felins Tying Machine Co., 3351 N. 35th St., Milwaukee 16, Wis.
Fellows Gear Shaper Co., The, Springfield, Vt.
Fenco, Inc., 125 N. Racine Ave., Chicago 7, Ill.
Fenster, I., & Sons, Inc., 50 Washington St., Brooklyn 1, N. Y.
Fenton Label Co., 506 Race St., Philadelphia 6, Pa.
Ferguson, Harry J., Co., 115 West Ave., Jenkintown, Pa.
•Ferguson, J. L., Co., Route 52 at Republic Ave., Joliet, Ill.
Ferguson-Lander Box Co., 740 Prairie St., Aurora, Ill.
Ferguson Machine & Tool Co., P. O. Box 191, St. Louis 21, Mo.
Ferguson, Martin J., 22 Purchase St., Rye, N. Y.
Ferrill, Harve, & Co., 11 E. Walton Place, Chicago 11, Ill.
Ferro Corp., Fiber Glass Div., 200 Woodycrest Ave., Nashville, Tenn.
Ferster, Reinhold C., 110 Pearl St., Buffalo 2, N. Y.
Fessenden Companies, Inc., Railroad Square, Townsend, Mass.
•Fibleco Illinois Corp., 4646 N. Clifton Ave., Chicago 40, Ill.
Fibre Box Assn., 224 S. Michigan Ave., Chicago, Ill.
Fibre Cord Ribbon Div., Kary-Safe Paper Bag Co., Inc., 755 E. 134th St., New York 55, N. Y.
Fibre Drum Co., 20 N. Wacker Drive, Chicago 6, Ill.
Fibre Drum Manufacturers Assn., P. O. Box 1328, Grand Central Station, New York 17, N. Y.
Fibre Partitions, Inc., 2300 S. Adams St., Peoria 2, Ill.
•Fibreboard Products, Inc., 1789 Montgomery St., San Francisco 11, Calif.
Fichte, Otto F., & Son, Inc., 104-44—200th St., Hollis 23, N. Y.
Field, H., & Sons, 2339 S. LaSalle St., Chicago 16, Ill.
Filler Machine Co., Inc., The, Pine Road & Reading Railroad, Philmont, Pa.
•Filmotype Corp., 60 W. Superior St., Chicago 10, Ill.
Fil-O-Matic Corp., 59 E. Van Buren St., Chicago 5, Ill.
Filpaco Industries, Inc., 2453 S. Michigan Ave., Chicago 16, Ill.
Filtrol Corp., 727 W. Seventh St., Los Angeles 17, Calif.
Findley, F. G., Co., The, 3033 W. Pemberton Ave., Milwaukee 8, Wis.
Fink, Karl, 515 Madison Ave., New York 22, N. Y.
•Finkelstein, A. D., & Co., Inc., 15 Wayne Ave., Suffern, N. Y.
Firestone Plastics Co., Box 690, Pottstown, Pa.
Firestone Tire & Rubber Co., The, 1200 Firestone Parkway, Akron 17, Ohio
Fischbein, Dave, Co., 38 Glenwood Ave., Minneapolis 3, Minn.
Fischer-Wehmann Corp., 4916 Hudson Blvd., West New York, N. J.
•Fisher's Foils Ltd., Exhibition Grounds, Wembley, Middlesex, England
Fiss Bros., Inc., 28 W. Houston St., New York 12, N. Y.
Fitchburg Paper Co., 642 River St., Fitchburg, Mass.
Fitler, Edwin H., Co., The, Devereaux & Milnor Sts., Philadelphia 24, Pa.
Fitzhugh, William W., Inc., 200 Fifth Ave., New York 10, N. Y.
Flambeau Plastics Corp., 501 Seventh St., Baraboo, Wis.
Flashfold Box Corp., 211 E. Wallace St., Fort Wayne 5, Ind.
Flash-O-Graph Corp., 270 Park Ave., New York 17, N. Y.
Fleishhacker Paper Box Co., 2701 Merced St., San Leandro, Calif.
Fleisig, A., Sons, Folding & Setup Paper Box Co., 472 Broadway, New York, N. Y.
Fleming-Potter Co., Inc., 1028 S. Adams St., Peoria 2, Ill.
Fleming & Sons, Inc., 1100 Clarendon Drive, Dallas, Texas
Fletcher, F. P., & Sons, 150 W. Green St., Pasadena 1, Calif.
Fletcher, H. E., Co., West Chelmsford, Mass.
Flexible Package Co., 2627 S. Stewart Ave., Chicago 16, Ill.
Flexible Tape Co., 278 S. Front St., Memphis 3, Tenn.
Flexigrip, Inc., 504 E. 74th St., New York, N. Y.
Flexline Products Co., 4143 Sheila St., Los Angeles 23, Calif.
Flexoveyor Manufacturing Co., 1220 S. Acoma St., Denver 23, Colo.
Flint, Howard, Ink Co., 2546 Clark Ave., Detroit 9, Mich.
Flintkote Co., The, 30 Rockefeller Plaza, New York 20, N. Y.
Flintkote Co., Pioneer Div., 5500 S. Alameda St., Los Angeles, Calif.
Flock Process Co., Inc., 375 Main Ave., Norwalk, N. Y.
Floquil Products, Inc., Cobleskill, N. Y.
Florian, Gordon, 97 Argonne St., Bridgeport 4, Conn.
Florida All-Bound Box Co., P. O. Box 848, Auburndale, Fla.
Flour City Paper Box Co., 510 Plymouth Ave., Minneapolis 11, Minn.
Flower City Specialty Co., Box 229, Rochester 1, N. Y.
Fluid Chemical Co., Inc., 878 Mt. Prospect Ave., Newark 4, N. J.
Flyndustries, Inc., 141 E. 44th St., New York 17, N. Y.
Foam King, Inc., 405 Bacon St., Bronx 59, N. Y.
Foam Pak Co., 1341 Brandywine St., Philadelphia, Pa.
Fogg, Ezra D., Co., Inc., The, 1632 Whitney Ave., Hamden 14, Conn.
Foil Kraft, Inc., 1805 Sichel St., Los Angeles 31, Calif.
Foil Products Inc., 2218 N. Liberty St., Winston-Salem, N. C.
•Foilcraft Printing Corp., 3611—14th Ave., Brooklyn 18, N. Y.
Folding Paper Box Assn. of America, 337 W. Madison St., Chicago 6, Ill.; 521 Fifth Ave., New York 17, N. Y.
Fonda Container Co., Inc., 15-21 Lower Newton St., St. Albans, Vt.
Fondiller, Robert, 33 W. 63rd St., New York 23, N. Y.
•Food Machinery & Chemical Corp., 1105 Coleman Ave., San Jose 10, Calif.
Forbes Brothers Co., 810 Santa Fe Ave., Los Angeles 21, Calif.
Forbes Lithograph Mfg. Co., P. O. Box 513, Boston 2, Mass.
Forbes Products Corp., 625 S. Goodman St., Rochester 20, N. Y.
Force, Wm. A., & Co., Inc., 216 Nichols Ave., Brooklyn 8, N. Y.
Ford, W. B., Design Corp., 1712 Guardian Bldg., Detroit, Mich.
Formo Displays Co., 3910 Cohasset St., Burbank, Calif.
Formold Plastics, Inc., 11955 Vincennes Ave., Blue Island, Ill.
Formvac Corp., Div. Welding Engineers, Inc., 601 W. 26th St., New York 1, N. Y.
Forsberg Paper Box Co., 2107 Fordem Ave., Madison 1, Wis.
Forsman, C. H., Co., 318 W. 39th St., New York 18, N. Y.
Forsters Machine Co., Ltd., 17 Yeading Lane, Hayes, Middx., England
•Fort Orange Paper Co., Castleton-on-Hudson, N. Y.

Fort Trumbull Paper Corp., The, 38 Canal St., New Haven 3, Conn.
Fort Wayne Corrugated Paper Co., 130 E. Douglas Ave., Fort Wayne 1, Ind.
Fort Worth Barrel Co., 100 W. Adams St., Fort Worth, Texas
Forward Products Co., Inc., 167-169 E. 31st St., Paterson 4, N. J.
Foster, Alan, Associates, 75 W. 45th St., New York, N. Y.
Foster & Cross, Inc., 109 Lexington Ave., Brooklyn, N. Y.
Foster-Forbes Glass Co., E. Charles St., Marion, Ind.
Foster Grant Co., Inc., 289 N. Main St., Leominster, Mass.
Foster, Robert, 14 Sutton Place, S., New York 22, N. Y.
Fountain Die Cutting Co., 533 Canal St., New York 18, N. Y.
Fownes Mfg. Co., Inc., Rochester, N. H.
Fox, C. J., Co., The, 236 Aborn St., Providence 1, R. I.
Fox Hills Tool & Die, 5805 Marilyn Ave., Culver City, Calif.
•Foxon Co., The, 235 W. Park St., Providence 1, R. I.
Franc-Graham Paper Co., Inc., 104 W. 17th St., New York 11, N. Y.
Frank, J. P., & Co., Inc., 11 E. 26th St., New York 10, N. Y.
Frank Paper Products Corp., 2941 E. Warren St., Detroit 7, Mich.
•Frank, Walter, Box 111, Elmhurst, Ill.
Frankel Associates, Inc., 56 W. 45th St., New York 36, N. Y.
Frankenberg Bros., Inc., 479 S. Ludlow St., Columbus 15, Ohio
Frankenstein, W. P., & Associates, Inc., 505 Elm St., Cincinnati 2, Ohio
Franklin Folding Box Co., 1914 W. 14th St., Chicago 8, Ill.
Franklin Plastics, Inc., Franklin, Pa.
Franklyn Folding Box Co., Inc., 53-01—74th St., Maspeth 78, N. Y.
Frann Paper Corp., 861 E. 29th St., Brooklyn 10, N. Y.
Franz, Richard M., 108 W. Wells St., Milwaukee 3, Wis.
•Frazier & Son, 20 Industrial West St., Allwood, Clifton, N. J.
Freedman Die Cutters, Inc., 285 Lafayette St., New York 12, N. Y.
Freedman, Leonard, & Sons, 45 W. 34th St., New York 1, N. Y.
French-Bray Printing Co., The, Candler Bldg., Baltimore 2, Md.
French Ivory Products Ltd., The, Plastics Ave., Toronto 14, Ont., Canada
Fretz Box Co., Route #309, Souderton, Pa.
Freund Can Co., 4445 Cottage Grove Ave., Chicago 15, Ill.
Frey, Louis, Sales Organization, 20 Branford Place, Newark 2, N. J.
Friedel, J. F., Paper Box Co., 215 Wallace St., Syracuse 1, N. Y.
Friedman Art Displays, 1151 Broadway, New York 1, N. Y.
Friend Box Co., 90 High St., Danvers, Mass.
Frohn, John C., 10 Thacher St., Boston 13, Mass.
Frostad Engineering Co., 3037 S. Wentworth Ave., Milwaukee 7, Wis.
•Fry, George H., Co., 42 E. Second St., Mineola, N. Y.
Fuchs & Lang Mfg. Co., Div. Sun Chemical Corp., 10th St. & 44th Ave., Long Island City 1, N. Y.
Fuerst, Edwin W., 137 Erie St., Toledo, Ohio
Fuld Bros., Inc., 742 S. Wolfe St., Baltimore 31, Md.
Fuller Displays, Inc., 5-39—48th Ave., Long Island City 1, N. Y.
Fuller, H. B., Co., 181 W. Kellogg Blvd., St. Paul 2, Minn.
Fuller Label & Box Co., 500 Dargan St., Pittsburgh 24, Pa.
Fulton Bag & Cotton Mills, Atlanta Ga.

G

G. D. Costruzioni Meccaniche, S/A, Bologna, Italy, 15 Park Row, New York 38, N. Y.
G. & D. Novelty Co., Inc., 31 Bond St., New York 12, N. Y.
G & T Manufacturing Co., Inc., 326 South St., New Britain, Conn.
Gabe-Bert Crafts, Inc., 70 McLean Ave., Yonkers 5, N. Y.
Gaetjens, Berger & Wirth, Inc., 35 York St., Brooklyn 1, N. Y.
•Gair, Robert, Co., Inc., 155 E. 44th St., New York 17, N. Y.
Gale Dorothea Mechanisms, Inc., 39-39 63rd St., Woodside, L. I., N. Y.
Gale Paper Products, Inc., 2619 Tillar St., Fort Worth 2, Texas
Gambon, Thomas F., 1344 Kroeger Drive, St. Louis 21, Mo.
Gamper Printing & Bronzing Co., Inc., 145 Hudson St., New York 13, N. Y.
Gamse Lithographing Co., Inc., 419 E. Lombard St., Baltimore 2, Md.
Ganz Bros., 52 New Bridge Road, Bergenfield, N. J.
Gardner Board & Carton Co., The, 407 Charles St., Middletown, Ohio
Gardner-Neumann, Inc., 47 Tiffany Place, Brooklyn 31, N. Y.
Garfield Box Co., 2 Canal St., Passaic, N. J.
Garrison Co., The, 1 Columbus Ave., Kenilworth, N. J.
Gates, N. T., Co., Drexel Bldg., Philadelphia 6, Pa.
Gates Paper Co., Ltd., The, 5955 S. Western Ave., Los Angeles 47, Calif.
•Gaylord Container Corp., 111 N. Fourth St., St. Louis 2, Mo.
Gayner Glass Works, 32 West Broadway, Salem, N. J.
Gebhart Folding Box Co., The, 20 S. Dutoit St., Dayton 2, Ohio
Gelatin Products Division, R. P. Scherer Corp., 9425 Grinnell Ave., Detroit 13, Mich.
Gellman Manufacturing Co., 1700 First St., Rock Island, Ill.
Gemloid Corp., 78-01 Queens Blvd., Elmhurst 73, N. Y.
Gencasco, Inc., 1911 Park Ave., New York 35, N. Y.
General Box Co., 1825 Miner St., Des Plaines, Ill.
General Cap & Container Corp., 50 Church St., New York 7, N. Y.
General Carton Co., 2444 Baldwin Road, Cleveland 4, Ohio
General Case Corp., 580 Fifth Ave., New York 36, N. Y.
•General Chemical Div., Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y.
General Container Corp., 1235 Williamson Bldg., Cleveland 14, Ohio
General Container Corp., 8050 S.E. 13th Ave., Portland 2, Ore.
General Corrugated Machinery Co., Inc., 141 W. Central Blvd., Palisades Park, N. J.
General Electric Co., 1 River Road, Schenectady 1, N. Y.
General Electric Co., Chemical & Metallurgical Div., 1 Plastics Ave., Pittsfield, Mass.
General Felt Products, Div. Standard Packaging Corp., 68—35th St., Brooklyn 32, N. Y.
General Fibre Co., 1723 Locust St., St. Louis 3, Mo.
General Fibre Products, 73-33 Woodhaven Blvd., Brooklyn 27, N. Y.
General Films, Inc., Covington, Ohio
General Foods Corp., Carton & Container Div., 490 E. Michigan St., Battle Creek, Mich.
General Gummed Products, Inc., 531 N. Stiles St., Linden, N. J.
General Latex & Chemical Corp., 666 Main St., Cambridge 39, Mass.
General Lithographing & Printing Co., 402 Kishwaukee St., Rockford, Ill.
General Machinery Corp., 1831 N. 18th St., Sheboygan, Wis.
General Mills, Inc., Research Labs., 2010 E. Hennepin Ave., Minneapolis 13, Minn.
General Packaging Equipment Co., 6100 Westview St., Houston 24, Texas
General Packaging Service, Inc., U. S. Highway 46, So. Hackensack, N. J.
General Paper Corp., 16 W. Second St., Cincinnati 2, Ohio
General Plastics Corp., 165 Third Ave., Paterson 4, N. J.
General Printed String Co., 2511 S. Fourth St., Milwaukee 7, Wis.
•General Printing Ink Co., Div. Sun Chemical Corp., 10th St. & 44th Ave., Long Island City 1, N. Y.
General Research & Supply Co., 572 S. Division Ave., Grand Rapids 3, Mich.
General Shippers Supply Co., 2500 N. Pulaski Rd., Chicago 39, Ill.
General Staple Co., 28 E. 22nd St., New York 10, N. Y.
General Tire & Rubber Co., Jeannette, Pa.
General Waxed Papers, Inc., 1700 S. Canal St., Chicago 16, Ill.
Georgia Crate & Basket Co., Inc., Thomasville, Ga.
Georgia-Pacific Plywood Co., 600 N. Capitol Way, Olympia, Wash.
Gerald Carton Co., 16 Court St., Brooklyn 1, N. Y.
Gerbereux, Dufft & Kinder, 80 Richards St., Brooklyn 31, N. Y.
Gereke-Allen Carton Co., Div. Eddy Paper Corp., 5101 Penrose St., St. Louis 15, Mo.
•Gering Products, Inc., N. Seventh St. & Monroe Ave., Kenilworth, N. J.
Germain's Seed & Plant Co., 747 Terminal St., Los Angeles, Calif.
Gerrard, A. J., & Co., 1950 Hawthorne Ave., Melrose Park, Ill.
Gerrard Steel Strapping Div., U. S. Steel Corp., 2915 W. 47th St., Chicago 32, Ill.
Gesell, R., Inc., 200 W. Houston St., New York 14, N. Y.
Geuder, Paeschke & Frey Co., 1400 W. St. Paul Ave., Milwaukee 1, Wis.
•Geveke & Co., Inc., 25 Broadway, New York 4, N. Y.
Gianninoto, Frank, & Associates, 133 E. 54th St., New York 22, N. Y.
Gibbs Bros., Cooperage Co., Overton & Jehl Sts., Hot Springs, Ark.
Gibbs-Brower Co., Inc., 21 E. 40th St., New York 16, N. Y.
•Gibraltar Corrugated Paper Co., Inc., Display Div., 3 Entin Rd., Clifton, N. J.
Gifford-Wood Co., 1 Hudson Ave., Hudson, N. Y.
Gift Wrappings, Inc., 230 Fifth Ave., New York 1, N. Y.
Gigante Paper Box Corp., 789 Secaucus Road, Jersey City 7, N. J.
•Gilbert Plastics, Inc., 1415 Chestnut Ave., Hillside, N. J.
Gillon Co., Inc., The, 811 S. 53rd St., Philadelphia 43, Pa.
Gilman Brothers Co., The, Gilman, Conn.
Gilman Paper Co., 630 Fifth Ave., New York 20, N. Y.
Gilosa, Joseph A., 601 W. 26th St., New York 1, N. Y.
•Gisholt Machine Co., 1351 E. Washington Ave., Madison 10, Wis.
Gisriel, George L., 516 N. Charles St., Baltimore 1, Md.
Gits Molding Corp., 4600 W. Huron St., Chicago 44, Ill.
Gittlin Bag Co., 309 Sherman Ave., Newark 5, N. J.
Glass Container & Closure Co., 275 Maujer St., Brooklyn 6, N. Y.
Glass Container Manufacturers Institute, Inc., 99 Park Ave., New York, N. Y.

Glass Containers, Inc., 1789 Montgomery St., San Francisco 11, Calif.
Glassine & Greaseproof Mfrs. Assn., 122 E. 42nd St., New York 17, N. Y.
Glassips, Inc., 23 W. Susquehanna Ave., Towson 4, Md.
Glave, Kenneth L., 319 Stark Court, Webster Groves 19, Mo.
Gleason Industries, 8467 Steller Drive, Culver City, Calif.
Glengarry Equipment Corp., Bay Shore, L. I., N. Y.
Glenn Electric Heater Corp., 254 Canal St., New York 13, N. Y.
Glenshaw Glass Co., Inc., Glenshaw, Pa.
•Globe Co., 4000 S. Princeton Ave., Chicago, Ill.
Globe Container Co., 900 Industrial Rd., San Carlos, Calif.
Globe Envelope Mfg. Co., 6552 Santa Monica Blvd., Los Angeles 38, Calif.
Globe Envelopes Limited, 1070 Queen St., E., Toronto 8, Canada
•Globe Heat-Seal, Inc., 3380 S. Robertson Blvd., Los Angeles 34, Calif.
Globe Imperial Corp., 2025 Kishwaukee St., Rockford, Ill.
Globe Manufacturing Co., 2009 Kinsey St., Philadelphia 24, Pa.
Globe Paper Box Co., 14th St. & Damen Ave., Chicago 8, Ill.
Globe Ticker Co., 112 N. 12th St., Philadelphia 7, Pa.
•Glo-Brite Products, 6415 N. California Ave., Chicago 45, Ill.
Gloco Products Co., 91-31——121st St., Richmond Hill 18, N. Y.
Gluetools, Inc., 1928 N. Meridian St., Indianapolis, Ind.
Glyco Products Co., Inc., Empire State Building, New York 1, N. Y.
Godfrey Conveyor Co., Inc., 13th St. at Wolf Ave., Elkhart, Ind.
Gold, Julius, Inc., 501 Fifth Ave., New York 17, N. Y.
Gold Leaf & Metallic Powders, Inc., 145 Nassau St., New York 38, N. Y.
Goldberg, Robert I., Associates, 284 Fifth Ave., New York 1, N. Y.
Golden Bear Mfg. Co., 4710 E. Washington Blvd., Los Angeles 22, Calif.
Golden State Box Factory, 1200 E. Eighth St., Los Angeles 21, Calif.
Goldman, Neal, Associates, Inc., 8 E. 48th St., New York 17, N. Y.
Gomar Mfg. Co., Inc., 79 Paris St., Newark 5, N. J.
Gondert & Lienesch, Inc., 29 Wayne Ave., Dayton 1, Ohio
Goodbar Mfg. Co., Div. Hargood Ribbon Co., Inc., 114 E. 32nd St., New York 16, N. Y.
Goodman, L. A., Mfg. Co., 131-145 W. 63rd St., Chicago 21, Ill.
Goodman, Nyles, 27 W. Fulton Ave., Freeport, L. I., N. Y.
Goodrich, B. F., Chemical Co., 324 Rose Bldg., Cleveland 15, Ohio
Goodrich, B. F., Co., The, 500 S. Main St., Akron, Ohio
Goodrich, B. F., Co., The, Plastics Division, Marietta, Ohio
•Goodyear Tire & Rubber Co., Inc., The, 1210 Massillon Road, Akron 15, Ohio
•Gordon Cartons, Inc., 1629 Warner St., Baltimore 30, Md.
Gordon, L., & Son, Inc., 1050 S. Paca St., Baltimore 30, Md.
Gordon-Lacey Chemical Products Co., Inc., 57-02——48th St., Maspeth 78, N. Y.
Gordon Plastic Products Corp., 685 Washington St., Lynn, Mass.
Goss Printing Press Co., The, 5601 W. 31st St., Chicago 50, Ill.
Gotham Ink & Color Co., 5-19——47th Ave., Long Island City 1, N. Y.
Gotham Plastics Corp., 220 E. 134th St., Bronx 51, N. Y.
•Gottscho, Adolph, Inc., Hillside 5, N. J.
Gould, Jerome F., Corp., 1562 DeKalb Ave., Brooklyn 37, N. Y.
Gould, Stephen, Paper Co., 205——10th St., Jersey City, N. J.
Grafflin Bag Co., Inc., 1407 Philpot St., Baltimore 24, Md.
Grand City Container Corp., 2001 Tonnelle Ave., No. Bergen, N. J.
Grant Paper Box Co., 3000 Liberty Ave., Pittsburgh 1, Pa.
Graphic Arts International Corp., 1 Grand Ave., Englewood, N. J.
Graphic Calculator Co., 633 Plymouth Court, Chicago 5, Ill.
Graphire Corp., 190 W. 237th St., New York 63, N. Y.
Grau, Russell, 412 W. Peachtree St., N.W., Atlanta, Ga.
Gravure Cylinder Corp., 1422 Grand St., Hoboken, N. J.
Gray Wire Specialty Co., The, 1761 E. 39th St., Cleveland 14, Ohio
Great American Plastics Co., 55 North St., Fitchburg, Mass.
Great Lakes Box Co., The, 7275 Wentworth St., Cleveland, Ohio
•Great Lakes Stamp & Mfg. Co., Inc., 2500 Irving Park Road, Chicago 18, Ill.
Great Southern Box Co., Inc., Southport St., New Orleans 9, La.
Great Western Paper Box Co., 2820 N. Ninth St., St. Louis 7, Mo.
Green Bay Box Co., 1406 S. Broadway, Green Bay, Wis.
Green Bay Tissue Mills, 614 Northern Bldg., Green Bay, Wis.
Green Brothers, Inc., 35 Valley St., East Providence 14, R. I.
Green, Frank W., Co., Point O' View, East Longmeadow, Mass.
Greene Packaging Service, 45 S. Lexington Ave., White Plains, N. Y.
Greenfield Paper Box Co., 55-57 Pierce St., Greenfield, Mass.
Greenspan Engraving Co., 775 Sixth Ave., New York 1, N. Y.
Greenwood Packaging Supply Co., 859-879 Summer Ave., Newark 4, N. J.
Greer Industries, Fayetteville, Ga.
Greer, J. W., Co., Main & Eames Sts., Wilmington, Mass.
Gregstrom Corp., 14 Davis St., Cambridge 39, Mass.
Greif Bros. Cooperage Corp., The, Pennsylvania Ave., Delaware, Ohio
Griffin, Campbell, Hayes, Walsh, Inc., 50 E. 21st St., New York 10, N. Y.
Grigoleit Co., The, 740 E. North St., Decatur, Ill.
Grimes, Rose, 1 Gracie Terrace, New York 28, N. Y.
Griswold & Co., Ltd., 146 Bates Rd., Montreal, Que., Canada
Grossman, Arthur, Associates, Inc., 803 Merchandise Mart, Chicago 54, Ill.
Grover, Frederic S., Associates, 154 East Ave., Rochester 4, N. Y.
•Growers Container Corp., Salinas, Calif.
Gruber Display Co., 205 W. 19th St., New York 11, N. Y.
Gruen, Robert, Associates, 509 Madison Ave., New York 22, N. Y.
Guardian Paper Co., 4246 Hollis St., Oakland 8, Calif.
Guardian Safety Seal Co., 35 E. Wacker Drive, Chicago 1, Ill.
Guide Co., The, Broad & Court Sts., Canfield, Ohio
Guildford Folding Box Co., The, Ashland Ave. & Haven St., Baltimore 5, Md.
Gulliksen, W. M., Mfg. Co., Newton Lower Falls 62, Mass.
Gummed Industries Assn., Inc., The, 11 W. 42nd St., New York 36, N. Y.
•Gummed Products Co., The, Union St., Troy, Ohio
Gummed Tape & Devices Co., 1069-71 Rogers Ave., Brooklyn 26, N. Y.
•Gump, B. F., Co., 1307 S. Cicero Ave., Chicago 50, Ill.
Gustin-Bacon Mfg. Co., 210 W. 10th St., Kansas City, Mo.
Gutmann, Ferdinand, & Co., 3611——14th Ave., Brooklyn 18, N. Y.

H

"HH" Manufacturers, 1140 West Broadway, Long Beach 2, Calif.
•H & R Industries, 344 E. Walnut St., Nazareth, Pa.
Hagopian, Vahan, 17 E. 49th St., New York 17, N. Y.
•Haida Engineering Co., 34-11 Vernon Blvd., Long Island City 6, N. Y.
Haiss, George, Mfg. Co., Div. Pettibone Mulliken Corp., 381 Canal Place, Bronx 51, N. Y.
•Hake Plastic Box Corp., 1215 Midvale Ave., S.W., Roanoke, Va.
Hall, Frances Cushing, Alfred University, Alfred, N. Y.
Hall, J. C., Co., The, 15 Sabin St., Pawtucket, R. I.
Hallam, Ben, Studio, 1600 Main St., Racine, Wis.
Halley Rotopress Corp., 3312 N. Ravenswood Ave., Chicago 13, Ill.
Halltown Paper Board Co., Halltown, W. Va.
Halsell Brokerage Co., 3101 Walnut St., Denver 5, Colo.
•Hamersley Manufacturing Co., The, 100 River Drive, Garfield, N. J.
Hamilton Caster & Mfg. Co., The, 1503 Dixie Highway, Hamilton, Ohio
Hamilton Tool Co., The, Ninth & Hanover Sts., Hamilton, Ohio
Hamlen, J. H., & Son, Inc., 2005 E. 17th St., Little Rock, Ark.
Hammer Lithograph Corp., 425 Exchange St., Rochester 8, N. Y.
Hammond Bag & Paper Co., P. O. Box 430, Wellsburg, W. Va.
Hampden Glazed Paper & Card Co., 100 Water St., Holyoke, Mass.
•Hampton Manufacturing Co., Industrial Tape Div., 111 Cedar St., New Rochelle, N. Y.
Hampton Products Co., Hester St., Portland, Pa.
Handy Roll Co., 1161 E. Florence St., Los Angeles 1, Calif.
Hankins Container Co., 14801 Emery Ave., Cleveland 11, Ohio
Hannconn Machine Co., Inc., 180 Lafayette St., New York 13, N. Y.
Hanover Cordage Co., E. Chestnut St., Hanover, Pa.
Hanovia Chemical & Mfg. Co., 1 W. Central Ave., East Newark, N. J.
Harco Industries, Inc., 20 Curtice St., Rochester 5, N. Y.
•Harcord Mfg. Co., Inc., 125 Monitor St., Jersey City 4, N. J.
Hardin Bag & Burlap Co., Inc., The, 1054 Constance St., New Orleans 7, La.
Harkin Affiliates, Inc., 331 Madison Ave., New York 17, N. Y.
Harley Co., The, 931——76th St., Brooklyn 28, N. Y.
Harley Earl, Inc., 28820 Mound Road, Center Line, Mich.
Harmon, Ira, Co., Inc., 331 Madison Ave., New York 17, N. Y.
Harmony House Press, 3 Park Place, New York 7, N. Y.
Harnischfeger Corp., 4400 W. National Ave., Milwaukee 46, Wis.
Harrington Tool & Die Co., Ltd., 755 First Ave., Lachine, Quebec, Canada
Harris-Seybold Co., 4510 E. 71st St., Cleveland 5, Ohio

Harrison, Norris, Ltd., Courtney St., Hull, Yorkshire, England
Hart Moisture Gauges, Inc., 126 Liberty St., New York 6, N. Y.
Harte & Co., Inc., 16 E. 34th St., New York 16, N. Y.
•Hartford City Paper Co., South Spring St., Hartford City, Ind.
Hartig Engine & Machine Co., 448 Hillside Ave., Hillside 4, N. J.
Hartung, A., & Co., 506-512 Race St., Philadelphia 6, Pa.
Harvey, Guy P., & Son Corp., 40 Spruce St., Leominster, Mass.
Harwid Co., The, 229 Binney St., Cambridge 42, Mass.
Hasco Plastics, Inc., 515-17 S. Townsend St., Syracuse 3, N. Y.
Haslett Chute & Conveyor Co., Oaks, Pa.
Hassler, W. Scott, Associates, 2601 W. Peterson Ave., Chicago 45, Ill.
Hastings & Co., Inc., 2314 Market St., Philadelphia 3, Pa.
Hayden Associates, 123-09 Beach Channel Drive, Rockaway Park, N. Y.
Hayes Adhesives Co., Inc., Union Blvd. & Brown Ave., St. Louis 15, Mo.
•Hayssen Manufacturing Co., St. Clair St., Sheboygan, Wis.
•Hazel-Atlas Glass Co., 15th & Jacob Sts., Wheeling, W. Va.
Hazen Paper Co., 208 Race St., Holyoke, Mass.
Heaphy, Charles F., Co., 420 Lexington Ave., New York 17, N. Y.
Heat Seal Label Co., 130 W. 26th St., New York 1, N. Y.
Hedeman Products, Inc., 117 Cutter Mill Road, Great Neck, N. Y.
Hedu, Jon, 65 Atwood St., Watertown, Conn.
Hedwin Corp., 1600 Roland Heights Ave., Baltimore 11, Md.
Heekin Can Co., The, 429 New St., Cincinnati 2, Ohio
Heidelberg Western Sales Co., 118 E. 12th St., Los Angeles 15, Calif.
•Heinrich, H. H., Co., 111 Eighth Ave., New York 11, N. Y.
Heintz Manufacturing Co., Front St. & Olney Ave., Philadelphia 20, Pa.
•Helix Machine Co., 140 E. Second St., Mineola, N. Y.
Heller Co., The, 2135 Superior Ave., Cleveland 14, Ohio
Heller & Usdan, Inc., 401 Washington St., New York 13, N. Y.
Helmold, J. F., & Bro., Inc., 1462 Shakespeare Ave., Chicago 14, Ill.
Heminway Corp., 155 S. Leonard St., Waterbury, Conn.
Hendershot Inks, Ltd., 65 Shaw St., Toronto, Ont., Canada
Henle Wax Paper Mfg. Co., Inc., 1428 Longfellow Ave., New York 59, N. Y.
Henry, Ira L., Co., Elm & Union Sts., Watertown, Wis.
Henry's Paper Products Co., 69 First St., Pittsfield, Mass.
Henschel, C. B., Mfg. Co., 229 W. Mineral St., Milwaukee 4, Wis.
Herald Paper Box Co., Inc., 375 West Broadway, New York 12, N. Y.
Herald Press, Inc., The, 1930 Camden Road, Charlotte, N. C.
•Herbert Products, Inc., 74-32 Jamaica Ave., Woodhaven 21, N. Y.
Hercules Box Co., 521 Marion Road, Columbus 7, Ohio
Hercules Paper Box Corp., The, 224 Cherry St., Bridgeport 6, Conn.
Hercules Powder Co., 995 Market St., Wilmington 99, Del.
Heresite & Chemical Co., 822 S. 14th St., Manitowoc, Wis.
Hermetite Corp., 245 Paterson Plank Road, Carlstadt, N. J.
Herrmann, John G., Co., The, 25 Stewart St., Floral Park, N. Y.
Herz, Alexander, Co., Inc., 840 E. 134th St., New York 54, N. Y.
Herz Manufacturing Corp., 840 E. 134th St., New York 54, N. Y.
Hess & Barker, 212 S. Darien St., Philadelphia 7, Pa.
•Hesser, Fr., Maschinenfabrik Aktiengesellschaft, Nauheimerstrasse 99, Stuttgart-Bad Canstatt, U. S. Zone, Germany
Hewson Co., Inc., The, 443 Broad St., Newark 2, N. J.
Heythum, Antonin, DeWitt, N. Y.
Heywood Manufacturing Co., 420 N. Third St., Minneapolis 1, Minn.
Heywood, R. R., Co., Inc., 263 Ninth Ave., New York 1, N. Y.
High Production Machine Co., Div. E. G. Staude Mfg. Co., Inc., 2675 University Ave., St. Paul, Minn.
Highland Container Co., Jamestown, N. C.
Highland Printers, 5216 Monte Vista St., Los Angeles 42, Calif.
Hi-Land Paper Products Div., Grand Bag & Paper Co., Inc., 88 N. Highland Ave., Ossining, N. Y.
Hilker Products Corp., 20 W. 22nd St., New York 10, N. Y.
Hill-Hentschel Co., 3928 Clayton Ave., St. Louis 10, Mo.
Hill, Thomas, Engineering Co. (Hull) Ltd., The, 247/9 Beverly Road, Hull, Yorkshire, England
Hills, A. C., & Co., 260 S. 20th St., Newark 3, N. J.
Hills, David Bennett, 581 Fifth Ave., New York 17, N. Y.
Hilsher Paper Box Co., 254 Schuyler Ave., Kingston, Pa.
Hinckley, M. C., Associates, 123 Harrison St., Bridgeport 4, Conn.
•Hinde & Dauch, 407 Decatur St., Sandusky, Ohio
Hines Pallet Co., P. O. Box 549, Mount Airy, N. C.
Hi-Speed Checkweigher Co., Inc., 407 Cliff St., Ithaca, N. Y.
Hoague-Sprague Corp., 130 Eastern Ave., Lynn, Mass.
•Hobbs Manufacturing Co., 26 Salisbury St., Worcester 5, Mass.
Hobson Miller Paper Co., 280 Lafayette St., New York 12, N. Y.
Hodge, T. Barry, Industrial Rd., Addison, Ill.
Hodges, Guy, 331 Madison Ave., New York 17, N. Y.
Hoerner Boxes, Inc., 600 Morgan St., Keokuk, Iowa
Hoff Condiments, R. D. No. 7, York, Pa.
Hofmann, Alfred, & Co., 635—59th St., West New York, N. J.
Hofmann & Leavy, Inc., 826 Broadway, New York 3, N. Y.
Hol-Bag, Inc., 120 E. 13th St., New York 3, N. Y.
Holes, Floyd A., Co., The, 100 Northfield Road, Bedford, Ohio
Holland Insulated Wire & Cable Works, Hamerstraat 10, Amsterdam, Holland
•Hollander, Allen, Co., 385 Gerard Ave., New York 51, N. Y.
Hollinger Corp., 3834 S. 4 Ml. Rn. Drive, Arlington 6, Va.
Hollingshead, R. M., Corp., Litho Can Div., 840 Cooper St., Camden, N. J.
Hollingsworth & Whitney Co., 60 Batterymarch St., Boston 2, Mass.
Hollis, Morton, 669 Boylston St., Boston 16, Mass.
Holmes Equipment Corp., 330 Victory Ave., So. San Francisco, Calif.
Holstein, Lee, Injection Molding, Inc., 53 Orchard St., Clifton, N. J.
Holyoke Card & Paper Co., 95 Fisk Ave., Springfield 7, Mass.
Holyoke Coated & Printed Paper Co., Inc., 8 Astor Place, New York 3, N. Y.
Homer-Alden Co., 10 Maple Ave., No. Attleboro, Mass.
Hooper, F. X., Co., Inc., Glenarm, Md.
Hooper, J. R., Co., 9250 W. 39th St., Brookfield, Ill.
Hooven & Allison Co., The, 555 Cincinnati Ave., Xenia, Ohio
Hope Machine Co., 9400-10 State Road, Philadelphia 14, Pa.
Hope Paper Co., Inc., 292 Ellery St., Brooklyn 3, N. Y.
Hopp Plastics, 460 W. 34th St., New York 1, N. Y.
•Horix Manufacturing Co., Corliss Sta., Pittsburgh 4, Pa.
Horn, A. C., Co., Inc., Div. Sun Chemical Corp., 10-10—44th Ave., Long Island City 1, N. Y.
Horne, E. C., Machinery Co., 1726 Champa St., Denver 2, Colo.
Horne Machinery Co., Inc., 1188 Harrison St., San Francisco 16, Calif.
Hornney & Co., 420 Lexington Ave., New York 17, N. Y.
Hornung, Clarence P., 220 E. 46th St., New York, N. Y.
House of Harley, Inc., 15 E. 40th St., New York 16, N. Y.
Howard Plastics, Inc., 1401 S. Main St., Council Bluffs, Iowa
Howe Scale Co., The, Rutland, Vt.
•Howell, F. M., & Co., 79-95 Pennsylvania Ave., Elmira, N. Y.
Howell Warehouse Ltd., 222 Front St., E., Toronto, Ont., Canada
Hubbs, Charles F., & Co., Div., Hubbs Corp., 53-01—11th St., Long Island City 1, N. Y.
Huber, J. M., Corp., 1478 Chesnut Ave., Hillside, N. J.
Huberts Co., 1161 E. Florence Ave., Los Angeles 1, Calif.
Hudson Pulp & Paper Corp., 477 Madison Ave., New York 22, N. Y.
•Hudson-Sharp Machine Co., 1201 Main St., Green Bay, Wis.
Hughes & Hoffman, 501 West Broadway, New York 12, N. Y.
Hulbert Engineering Corp., 600 Western Ave., Watertown, Wis.
Hull, A. E., Pottery Co., Crooksville, Ohio
Humidial Co., P. O. Box 464, Colton, Calif.
Humitube Mfg. Co., 233 N. Madison St., Peoria 3, Ill.
Hummel, A. C., Co., 5349 Kennedy Ave., Cincinnati 13, Ohio
Hunt, Harry E., Co., Ltd., P. O. Box 184, O'Connor Drive, Toronto, Ont., Canada
Hunt, Wm. J., Mfg. Co., 115 Hollingsworth St., Baltimore 2, Md.
Hunter-Wilson Distilling Co., Oil City, Pa.
Hurwich, R., Co., 1043 Hearst Ave., Berkeley 2, Calif.
Huxtable, L. Garth, 46 E. 76 St., New York 21, N. Y.
Hydraulic Press Mfg. Co., Marion Rd., Mt. Gilead, Ohio
Hydrawlik Co., 131 E. First Ave., Roselle, N. J.
Hygrade Folding Box Corp., 92-00 Atlantic Ave., Woodhaven 16, N. Y.
Hy-Sil Mfg. Co., Revere 51, Mass.
Hyster Co., 2902 N.E. Clackamas St., Portland 8, Ore.

I

•I. D. Company, 150 Spring St., New York 12, N. Y.
Ideal Gold Stamping Co., 990 6th Ave., New York, N. Y.
Ideal Packagings Ltd., 1 Shrewsbury Road, London, N.W. 10, England
Ideal Packers, Inc., 196 West Broadway, New York 13, N. Y.

Ideal Plastics Corp., 184-10 Jamaica Ave., Hollis 23, N. Y.
Ideal Stencil Machine Co., 145 Iowa Ave., Belleville, Ill.
Ideal Stitcher Co., Div. W. R. Pabich Mfg. Co., 2855 N. Rockwell St., Chicago 18, Ill.
Illinois Container Co., 511 W. 47th Place, Chicago, Ill.
Illinois Cooperage Mfg. Co., 44th Place & S. Justine St., Chicago 9, Ill.
•Imco Container Corp., 75th & Cleveland Sts., Kansas City 30, Mo.
Impact Extrusions Ltd., Browell's Lane, Feltham, Middlesex, England
Impact-O-Graph Corp., The, 1900 Euclid Ave., Cleveland 15, Ohio
Imperial Adhesives Co., 55 N. Fourth St., Brooklyn 11, N. Y.
Imperial Box Co., Div. Morris Paper Mills, 1740 N. 25th Ave., Melrose Park, Ill.
Imperial Chemical Industries, Ltd., Plastics Div., Black Fan Road, Welwyn Garden City, Herts., England
Imperial Molded Products Corp., 2925 W. Harrison St., Chicago 12, Ill.
Imperial Paper Box Corp., 252 Newport St., Brooklyn 12, N. Y.
Improved Machinery, Inc., Burke St., Nashua, N. H.
Improved Mailing Case Co., 305 Broadway, New York 7, N. Y.
Independent Can Co., 934 S. Lakewood Ave., Baltimore 24, Md.
Independent Lithograph Co., 16th & Alabama St., San Francisco 3, Calif.
•Indianapolis Paper Container Corp., 217 W. Tenth St., Indianapolis 2, Ind.
Indianapolis Wire Bound Box Co., 1300 Beecher St., Indianapolis 7, Ind.
Induction Heating Corp., 181 Wythe Ave., Brooklyn 11, N. Y.
Industrial Bag & Cover Assn., The, 11 W. 42nd St., New York 36, N. Y.
Industrial Container Corp., 50th St. & 2nd Ave., Brooklyn, N. Y.
Industrial Conveyor Corp., 512 S. Peoria St., Chicago 7, Ill.
Industrial Electronics Co., Hanover St., Hanover, Mass.
Industrial Equipment & Repair Co., 306 E. 123 St., New York 35, N. Y.
Industrial Lithographic Co., Inc., 285 Madison Ave., New York 17, N. Y.
•Industrial Marking Equipment Co., Inc., 454 Baltic St., Brooklyn 17, N. Y.
Industrial Mineral Fiber Institute, 441 Lexington Ave., New York 17, N. Y.
Industrial Packaging Co., P. O. Box 3596, Greenville, S. C.
Industrial Packaging Co., Inc., Ridgefield Park, N. J.
Industrial Products (Speco) Limited, 7 Boston Manor Road, Brentford, Middlesex, England
•Industrial Raw Materials Corp., 575 Madison Ave., New York 22, N. Y.
Industrial Shredder & Cutter Co., 708 S. Ellsworth St., Salem, Ohio
Industrial Steel Container Co., 220 Eagle St., St. Paul 2, Minn.
Industrial Steel & Fibre, Ltd., 17-19 St. Joseph St., Terrebonne, Que., Canada
Industrial Tape Printers, Div. Industrial Equipment & Supply Co., 6 West Penn Ave., Wernersville, Pa.
•Industrie-Werke Karlsruhe Aktiengesellschaft, Karlsruhe, U. S. Zone, Germany
Ingersoll Studios, 4 W. 40th St., New York 27, N. Y.
•Injection Molders Supply Co., 3514 Lee Rd., Cleveland 20, Ohio
Injection Molding Corp., 113 Fourth Ave., New York 3, N. Y.
•Inland Container Corp., 700 W. Morris St., Indianapolis 6, Ind.
Inland Lithograph Co., 328 S. Jefferson St., Chicago 6, Ill.
Inland Steel Container Co., Div. Inland Steel Co., 6532 S. Menard Ave., Chicago 38, Ill.
•Inland Wire Products Co., 3947 S. Lowe Ave., Chicago 9, Ill.
•Inman Mfg. Co., Inc., 41-53 Guy Park Ave., Amsterdam, N. Y.
Institute of Food Technologists, 176 W. Adams St., Chicago, Ill.; Geneva, N. Y.
Institute of Paper Chemistry, The, Appleton, Wis.
•Intaglio Service Corp., 305 E. 46th St., New York 17, N. Y.
Inta-Roto Engraving Corp., RFD 6, Box 61, Byrd Airport, Richmond 23, Va.
•Inta-Roto Machine Co., Inc., RFD 6, Box 61, Byrd Airport, Richmond 23, Va.
•Interchemical Corp., Printing Ink Div., 67 W. 44th St., New York 36, N. Y.
Inter-Lakes Engineering Co., 4845 Bellevue St., Detroit 7, Mich.
International Banding Machine, Div. Consolidated Lithographing Corp., 1013 Grand St., Brooklyn 11, N. Y.
International Cooperage Co., Box 518, Hyde Park Blvd., Niagara Falls, N. Y.
•International Folding Paper Box Co., Inc., 2029—83rd St., No. Bergen, N. J.
International Machinery Corp., Breedstraat, 2, St. Nicolas-Waes, Belgium
•International Paper Box Machine Co., The, 315 Main St., Nashua, N. H.
International Paper Co., 220 E. 42nd St., New York 17, N. Y.
•International Staple & Machine Co., 8th & Herrin Sts., Herrin, Ill.
International Wax Refining Corp., E. Hawthorne Ave. & L. I. R. R., Valley Stream, N. Y.
Interstate Chemical Products Co., 1228 W. 12th St., Kansas City 5, Mo.
Interstate Folding Box Co., The, Verity Parkway, Middletown, Ohio
Interstate Printing Co., 3935 Laclede St., St. Louis, Mo.
Ironbound Box & Lumber Co., 36 Hoffman Place, Hillside, N. J.
Irvington Div., Minnesota Mining & Mfg. Co., 6 Argyle Terrace, Irvington 11, N. J.
Irwin Corp., 85 Factory St., Nashua, N. H.
•Island Equipment Corp., 27-01 Bridge Plaza, N., Long Island City 1, N. Y.
•Ivers-Lee Co., 215 Central Ave., Newark 4, N. J.
Ivorex Plastics, 116 Broad St., New York 4, N. Y.

J

•J. E. Plastics Mfg. Corp., 555 W. 23rd St., New York 11, N. Y.
J. L. Paper Box Co., Inc., 67 Mechanic St., Attleboro, Mass.
Jackson, McStay, 840 N. Michigan Ave., Chicago 11, Ill.
Jackson Paper Box Co., 100-110 W. Pearl St., Jackson, Mich.
Jackson, Thomas, & Son Co., 9th & Oley Sts., Reading, Pa.
Jacksonville Ginter Box Co., Inc., Walnut & 16th St., Jacksonville, Fla.
Jacobowitz, Charles S., Corp., 3080 Main St., Buffalo 14, N. Y.
Jacobs, K. W., Cooperage Co., 1907 W. St. Paul Ave., Milwaukee 3, Wis.
Jacobsson, Edward Gustave, 147 E. 50th St., New York 22, N. Y.
Jacoby-Narce Corp., 72 Spring St., New York 12, N. Y.
Jagenberg-Werke Akt.-Ges., Himmelgeister Str. 107, Dusseldorf, West Germany
Jamieson, Walter J., Corp., 140 N. Fitzhugh St., Rochester 14, N. Y.
Jamison Plastic Corp., 1255 Newbridge Rd., No. Bellmore, L. I., N. Y.
Jastremsky, B., 17 Clarendon St., Boston 16, Mass.
Java Latex & Chemical Corp., 1713 West Farms Road, New York, N. Y.
Jay, Norbert, 1206 Empire State Bldg., New York 1, N. Y.
Jaymark Paper Co., P. O. Box 152, Hewlett, N. Y.
Jeffrey Mfg. Co., The, N. Fourth at First Ave., Columbus 16, Ohio
Jepson, Tinsley T., 35 N. Raymond Ave., Pasadena 1, Calif.
Jerry, Stephen, & Co., 495 Manhattan Ave., Brooklyn 22, N. Y.
Jet Manufacturing Co., Inc., 288 Hyde Park Ave., Boston 30, Mass.
Jet-Pak, Inc., 859-879 Summer Ave., Newark 4, N. J.
Jet Specialties Co., 941 N. Eastern Ave., Los Angeles 63, Calif.
Jewett, A. S., 505 Fifth Ave., New York 17, N. Y.
•Jiffy Mfg. Co., 360 Florence Ave., Hillside, N. J.
Joa, Curt G., Inc., Clark St., Sheboygan Falls, Wis.
Joanna Western Mills Co., 22nd & Jefferson Sts., Chicago 16, Ill.
Johnson, A., Machine Works, Inc., 437 Boulevard, East Paterson, N. J.
Johnson, Gordon, Co., 2519 Madison Ave., Kansas City, Mo.
Johnson, Mary Russell, 266 W. 123rd St., New York, N. Y.
Johnson, Will, 600 W. Jackson Blvd., Chicago 6, Ill.
Johnsos-Coppock Co., 8026 Lawndale Ave., Skokie, Ill.
•Johnston Foil Mfg. Co., 6106 South Broadway, St. Louis 11, Mo.
Johnstone Engineering & Machine Co., Parkesburg, Pa.
Jolley, Jerry, 2426 Buchanan St., San Francisco, Calif.
Jones Box & Mill Division, 344 Delaware Ave., Buffalo 2, N. Y.
Jones, Charles E., & Associates, Inc., 189 W. Madison St., Chicago 2, Ill.
Jones-Dabney Co., Rutherford & Delancey Sts., Newark 5, N. J.
Jones, E. Willis, 44 E. Superior St., Chicago 11, Ill.
Jones, Jesse, Box Corp., P. O. Box 5120, Philadelphia 41, Pa.
Jones & Laughlin Steel Corp., 401 Liberty Ave., Pittsburgh, Pa.
•Jones, R. A., & Co., Inc., P. O. Box 485, Cincinnati 1, Ohio
Just Plastics, Inc., 256 W. 65th St., New York 23, N. Y.

K

•KVP Co., Kalamazoo, Mich.
Kabar Mfg. Corp., 1907 White Plains Road, New York 62, N. Y.
Kage Co., 130 Hartford Road, Manchester, Conn.
Kahlenberg Globe Equipment Co., P. O. Box 3636, Sarasota, Fla.
•Kaiser Aluminum & Chemical Corp., 1916 Broadway, Oakland, Calif.
Kalamazoo Label Co., 321 W. Ransom St., Kalamazoo 12, Mich.
Kalamazoo Paper Box Co., 385 S. Pitcher St., Kalamazoo, Mich.
Kalamazoo Paraffin Co., 1801-21 Reed St., Kalamazoo, Mich.
Kaltman Press, Inc., 52-25 Barnett Ave., Long Island City 4, N. Y.
Kamp, Bruce, Associates, 1716 Spruce St., Philadelphia 3, Pa.

Kansas City Barrel & Package Co., 1324-36 Jasper St., No. Kansas City 16, Mo.
Kanty, C. L., Paper Box Corp., 140 Carter St., Rochester 21, N. Y.
Kaplan Products & Textiles, Inc., 180 W. Randolph St., Chicago 1, Ill.
Karp Co., The, 123 First St., Jersey City 2, N. J.
•Karstrom, Paul L., Co., 1820 W. 74th St., Chicago 36, Ill.
Kartridg-Pak Machine Co., 435 W. Scott St., Chicago 10, Ill.
Kary-Safe Paper Bag Co., Inc., 755 E. 134th St., New York 54, N. Y.
Kaufman Hoag Co., 350 Fifth Ave., New York 1, N. Y.
Kaumagraph Co., 14th & Poplar Sts., Wilmington 99, Del.
Kay, Inc., 142 E. 49th St., New York 17, N. Y.
Kaye Plastics Corp., P. O. Box 1149, New Brunswick, N. J.
Kayton, Robert, Associates, Inc., 89 W. Third St., New York 12, N. Y.
Keeny, J. R., Co., 214 Biltmore Road, Louisville 7, Ky.
Kehlmann Printing Co., 151 W. 25th St., New York 1, N. Y.
Kehr Products Co., 401 N. Broad St., Philadelphia 8, Pa.
Keiding Paper Products Co., 3048 N. 34th St., Milwaukee 10, Wis.
Keith-Peabody, Inc., 77 N. Washington St., Boston 14, Mass.
Kellogg Container Div., U. S. Envelope Co., 21 Cypress St., Springfield 2, Mass.
Kelly, E. J., Co., Div. Sun Chemical Corp., 1807 N. Pitcher St., Kalamazoo 45, Mich.
Kelley Press, 317 S. Main St., Greensburg, Pa.
Kendall Co., Plastic Film Sales Dept., 222 W. Adams St., Chicago 6, Ill.
Kendall Mills, Div. The Kendall Co., West St., Walpole, Mass.
Kennedy Car Liner & Bag Co., Inc., Hodell St., Shelbyville, Ind.
Kent, Percy, Bag Co., Inc., 5910 Winner Rd., Kansas City 25, Mo.
Kent Plastics Corp., 1528 N. Fulton Ave., Evansville 10, Ind.
Keokuk Barrel Co., 30 N. 5th Street, Keokuk, Iowa
Keolyn Plastics, Inc., 2731 N. Pulaski Rd., Chicago 39, Ill.
Kerr, Alexander H., & Co., Inc., 6001 S. Fairfax Ave., Los Angeles 56, Calif.
Kerr, Robert J., Chemicals, Inc., P. O. Box 443, Park Ridge, Ill.
Kesco Mfg. Co., 5614 Blackstone Ave., Chicago 37, Ill.
Ketcham, Howard, Inc., 101 Park Ave., New York 17, N. Y.
Ketchpel Engineering Co., 1401 Palisade Ave., West Englewood, N. J.
Ketterlinus Lithographic Mfg. Co., Mildred Ave., Primos, Pa.
Keyes Fibre Sales Corp., 420 Lexington Ave., New York 17, N. Y.
Keystone Box Co., P. O. Box 7821, Sharpsburg Sta., Pittsburgh 15, Pa.
Keystone Cap Co., 10th & Blunston Sts., Columbia, Pa.
Keystone Folding Box Co., 367-373 Verona Ave., Newark 4, N. J.
Keystone Packaging Service, 1012 Washington St., Easton, Pa.
Keystone Paper Box Co., York, Pa.
Kidde, Walter, & Co., Inc., 1066 Main St., Belleville 9, N. J.
•Kidder Press Co., Inc., 121 Broadway, Dover, N. H.
Kieckhefer Container Co., P. O. Box 710, Camden 1, N. J.
Kiefer, Karl, Machine Co., The, 919 Martin St., Cincinnati 2, Ohio
Kieffer Paper Mills, Ewing, Ind.
Kiernan-Hughes Co., Ninth & Brunswick Sts., Jersey City 2, N. J.
Kimball, A., Co., 442 Fourth Ave., New York 16, N. Y.
Kimball-Tyler Co., 201-301 S. Haven, Baltimore, Md.
Kimberly-Clark Corp., Neenah, Wis.
Kimble Glass Co., Sub. Owens-Illinois Glass Co., Box 1035, Toledo 1, Ohio
Kindred, MacLean & Co., Inc., 43-01—22nd St., Long Island City 1, N. Y.
Kinex Co., Inc., The, 15 Dale St., Needham Heights 94, Mass.
King, Charles E., & Co., 960 W. Chicago Ave., Chicago 22, Ill.
King Plastic Products Corp., 22-25—119th St., College Point, L. I., N. Y.
King Sales & Engineering Co., 441 Folsom St., San Francisco 5, Calif.
Kingman, E. B., Co., 96 Exchange St., Leominster, Mass.
Kingsbury & Davis Machine Co., Contoocook, N. H.
Kirby-Cogeshall-Steinau Co., 606 E. Clybourn St., Milwaukee 2, Wis.
Kirk, F. J., Molding Co., Inc., 140 Brook St., Clinton, Mass.
Kittredge, R. J., & Co., 14 N. Peoria St., Chicago 7, Ill.
Kiwi Coders Corp., 3804 N. Clark St., Chicago 13, Ill.
Klausner Cooperage Co., 5207 Grant Ave., Cleveland 4, Ohio
•Kleen-Stik Products, Inc., 7300 W. Wilson Ave., Chicago 31, Ill.
Kleerwrap, Div. Creative Publishing & Packaging, Inc., 225 E. Hawley St., Mundelein, Ill.
Klein, A., & Co., Inc., 113-119 W. 17th St., New York 11, N. Y.
Kleinhans, Herbert F., Associates, 122 E. 42nd St., New York, N. Y.
Kleist & Co., 2622 S.E. 25th Ave., Portland 2, Ore.
Kliklok Corp., 405 Lexington Ave., New York 17, N. Y.
Knickerbocker Co., The, 1000 Liberty St., Jackson, Mich.
•Knowlton, M. D., Co., 28 Industrial St., Rochester 14, N. Y.
Knox Bros., Inc., 101 Park Ave., New York, N. Y.
Knox Glass Associates, Inc., Penn Ave., Knox, Pa.
Koch Convertograph Co., 1405 W. Missouri St., Evansville 7, Ind.
Koch, Karl Peter, 35 E. Wacker Drive, Chicago 1, Ill.
Koehler, Karl, Associates, Coopersburg, Pa.
Koehler & Worden, 616 Riverside Ave., Westport, Conn.
Kogan, Belle, Associates, 362 Fifth Ave., New York 1, N. Y.
Kolar Laboratories, Inc., 7475 N. Rogers Ave., Chicago 26, Ill.
Koller Craft Plastic Products, Inc., Fenton, Mo.
Kolmar Laboratories, Inc., 224 North Broadway, Milwaukee 2, Wis.
Koodin-Lapow Associates, 250 W. 57th St., New York 19, N. Y.
Koons, F. S., 124 S. Washington St., Boyertown, Pa.
Koppel, E. Leonard, 40 E. 49th St., New York 17, N. Y.
Koppers Co., Inc., Koppers Bldg., Pittsburgh 19, Pa.
Korda Associates, 20 W. 46th St., New York 36, N. Y.
Kordite Corp., Macedon, N. Y.
Korn, Henry P., 5 Beekman St., New York 38, N. Y.
Kornfeld, Herbert L., 1505 Cross Roads of The World, Hollywood 28, Calif.
Kosmak, George, 45 Castle St., San Francisco 11, Calif.
Koster, Louis, Associates, Freeport, Maine
Kraber, George R., 2915½ W. Florence Ave., Los Angeles 43, Calif.
Krafco Container Corp., 1020 Mercantile Securities Bldg., Dallas, Texas
Kraft Bag Corp., 630 Fifth Ave., New York 20, N. Y.
Kraft Corrugated Containers, Inc., Foot of E. 22nd St., Bayonne, N. J.
Kraft Paper Assn., Inc., 122 E. 42nd St., New York 17, N. Y.
Kraissl Co., Inc., 309 Williams Ave., Hackensack, N. J.
Krause, Frederick A., Associates, Inc., Frenchtown, N. J.
Krause, Richard M., Inc., 52 E. 19th St., New York 3, N. Y.
Krengel Mfg. Co., Inc., 227 Fulton St., New York 7, N. Y.
Kresge Paper Box Co., Inc., 645 Main St., Bethlehem, Pa.
Kress, F. J., Box Co., 1—28th St., Pittsburgh 22, Pa.
Kroeck Paper Box Co., 1701 W. Superior St., Chicago 22, Ill.
Krylon, Inc., 2038 Washington Ave., Philadelphia 46, Pa.
Kupfer Bros. Co., 2 Astor Place, New York 3, N. Y.
Kurnit-Geller Associates, Inc., 505 Fifth Ave., New York 17, N. Y.
Kuss, R. L., & Co., Inc., P. O. Box 586, Findlay, Ohio
Kweller, Sam, 722 E. Washington Blvd., Los Angeles 21, Calif.
Kwik Lok Corp., 17 N. 7th Ave., Yakima, Wash.

L

L. A. Paper Box & Board Mills, 2615 E. 12th St., Los Angeles 23, Calif.
L. A. B. Corp., P. O. Box 278, Skaneateles, N. Y.
L & M Sales Co., 1414 S. Michigan Ave., Chicago 6, Ill.
L.O.F. Glass Fibers Co., 1810 Madison Ave., Toledo 1, Ohio
Label Manufacturers National Assn., Inc., 1700 Eye St., N.W., Washington 6, D. C.
Labelon Tape Co., Inc., 450 Atlantic Ave., Rochester 9, N. Y.
Label-Rite Co., Ltd., The, 21 Edgar Ave., Weston, Ont., Canada
Labels & Decals, Inc., 4880 W. Grand Ave., Chicago 39, Ill.
La Boiteaux Co., Inc., The, 2985 Madison Road, Cincinnati 9, Ohio
Labquip Corp., 4520 W. North Ave., Chicago 39, Ill.
•Lachman-Novasel Paper Corp., 107-111 Greene St., New York 12, N. Y.
Lake Laboratories Co., 817 Wood St., Philadelphia 7, Pa.
Lake-River Terminals, Inc., P. O. Box A, Argo, Ill.
•Lakso Co., Inc., The, 47 Ashby State Rd., Fitchburg, Mass.
Lamarque, Abril, 207 E. 37th St., New York 16, N. Y.
Lamb Glass Co., The, Mount Vernon, Ohio
Lambooy Label & Wrapper Co., 2129 Portage St., Kalamazoo 29F, Mich.
Laminated Foil Manufacturers Assn., 1002 Union Trust Bldg., Providence 3, R. I.
Laminated Paper Products Co., 2665 Jones St., San Francisco 11, Calif.
Laminators, Inc., 243 Passaic St., Newark 4, N. J.
Laminite Products Corp., 799 Washington St., New York 14, N. Y.
Lamson Corp., Lamson St., Syracuse 1, N. Y.
Lancaster Paper Tube Mfg. Co., 834 Columbia Ave., Lancaster, Pa.
Landau Metal Products Corp., 2-62—51st Ave., Long Island City 1, N. Y.

Landis, Ellis M., 226 S. 52nd St., Philadelphia 39, Pa.
Landor, Walter, & Associates, 143 Bush St., San Francisco 4, Calif.
Landowne, J., Co., Inc., 561 Grand Ave., Brooklyn 38, N. Y.
Landsberger Co., 550 Fifth Ave., New York 36, N. Y.
Lange & Crist Box & Lumber Co., Inc., P. O. Box 2071, Clarksburg, W. Va.
Langston, Samuel M., Co., 1930 S. Sixth St., Camden 4, N. J.
Lanham Machinery & Service Co., Inc., 746 Stewart Ave., S.W., Atlanta, Ga.
Lansky Die Cutting Corp., 194 Greene St., New York 12, N. Y.
Lanzit Printing Co., 1051 Grand View St., Los Angeles 6, Calif.
Larido Corp., 381 Fourth Ave., New York 16, N. Y.
Larkin & Glassman Associates, 27 School St., Boston 8, Mass.
Laros Printing Co., Inc., P. O. Box 429, Easton, Pa.
Larson Packaging Equipment Co., 6644 Marquette Ave., St. Louis 9, Mo.
Lassiter Corp., 1143 E. Fourth St., Charlotte 4, N. C.
Latchford-Marble Glass Co., Box 4707 Florence Branch, Los Angeles 1, Calif.
Laurel Manufacturing Co., Inc., P. O. Box 188, Laurel, Va.
LaWall & Harrison, 1921 Walnut St., Philadelphia 3, Pa.
Lawless Bros. Container Corp., 51 Robinson St., No. Tonawanda, N. Y.
Lawson & Jones Limited, London, Ont., Canada
Lawson & Lawson, Inc., 723 Seventh Ave., New York, N. Y.
Lea, David M., & Co., Inc., Hopkins Rd., Richmond 12, Va.
Lea Laboratories, Inc., 408 Blade Ave., Cincinnati 16, Ohio
Lead Industries Assn., 420 Lexington Ave., New York 17, N. Y.
Lea-Tek Studio, Lake Zurich, Ill.
Leavitt, S. Taylor, Associates, Inc., 211 E. Superior St., Chicago 11, Ill.
•Lebanon Paper Box Co., Lebanon, Pa.
Leber, Ralph, Co., 426 Polson Bldg., Seattle 4, Wash.
Lee & Henry Mfg. Co., 441-5 Minna St., San Francisco 3, Calif.
Leedall Products, Inc., 351 W. 35th St., New York 1, N. Y.
Leedpak-Leeds Sales Co., Inc., 294 Fifth Ave., New York 1, N. Y.
Leeds Paper Products, Inc., Main St., Leeds, Mass.
Lehmann Printing & Lithographing Co., 300 Second St., San Francisco 7, Calif.
Leigh, Carl, Associates, 53 W. Jackson Blvd., Chicago 4, Ill.
Leiman Bros., Inc., 166 Christie St., Newark 5, N. J.
Lembo Machine Works, Inc., 248 E. 17th St., Paterson 4, N. J.
Lengsfield Bros., Inc., 1101 Tchoupitoulas St., New Orleans 6, La.
Leominster Board & Specialty Co., 43 Granite St., Leominster, Mass.
Leominster Paper Box Co., Inc., 43 Granite St., Leominster, Mass.
LePage's, Inc., 144 Essex Ave., Gloucester, Mass.
•Lerner Plastics, Inc., 502 South Ave., Garwood, N. J.
Lerner Machine Co. Ltd., The, Lea Valley Road, Ponders End, Middlesex, England
Lescaze, William, 211 E. 48th St., New York, N. Y.
Lester Engineering Co., 2711 Church Ave., Cleveland 13, Ohio
Le Sure Product Co., 1049 St. Nicholas Ave., New York 55, N. Y.
Lev-A-Lift Co., The, 277 Broadway, New York 7, N. Y.
Levey, Fred'k H., Co., Inc., 380 Madison Ave., New York 17, N. Y.
Levey, Harold A., Laboratories, 8127-33 Oleander St., New Orleans 18, La.
Levin, Monte L., 501 Madison Ave., New York 22, N. Y.
Levine, H., Cooperage Co., 5400 S. Soto, Los Angeles, Calif.
Levine, M. H., Co., Inc., 28 W. 27th St., New York 1, N. Y.
Levis, John A., & Sons, Inc., 330 Lyell Ave., Rochester 6, N. Y.
Levy, J., 804 W. 180th St., New York 33, N. Y.
Lewis, Ben, 414 Madison Ave., New York 17, N. Y.
Lewis, G. B., Co., 426 Montgomery St., Watertown, Wis.
Lewis, Harold P., Newtown, Pa.
Lewis-Shepard Products, Inc., 125 Walnut St., Watertown 72, Mass.
Lewis, Stephen J., Engineering Co., 215 Butler St., Brooklyn 17, N. Y.
Lewis Welding & Engineering Corp., 1 Interstate St., Bedford, Ohio
Lewy, Morris L., & Co., 350 Fifth Ave., New York 1, N. Y.
Libbie Printing Co., The, 465 Cambridge St., Allston 34, Mass.
Liberty Corrugated Container Corp., 47-40 Metropolitan Ave., Brooklyn 37, N. Y.
Liberty Cutting Die Co., 39 Great Jones St., New York 12, N. Y.
Liberty Glass Co., Lee & Oak Sts., Sapulpa, Okla.
Liberty Paper Box Co., 400 W. Third St., Winona, Minn.
Liebs, L. A., Co., Inc., 312 E. 23rd St., New York 10, N. Y.
Lift Trucks, Inc., 2425 Spring Grove Ave., Cincinnati 14, Ohio
Lilly, Eli, & Co., Indianapolis, Ind.
Lily-Tulip Cup Corp., 122 E. 42nd St., New York 17, N. Y.
Lincoln Products, Inc., 85 Springdale Ave., Newark 7, N. J.
Lindley Box & Paper Co., Div. of Morris Paper Mills, 1748 W. Second St., Marion, Ind.
Lindstaedt Laboratories, 109 Fawn Drive, San Anselmo, Calif.
Linehan & Co., 2062 Irving Blvd., Dallas 7, Texas
Link-Belt Co., 307 N. Michigan Ave., Chicago 1, Ill.
Linvure Co., Inc., The, 74 India St., Boston 10, Mass.
Lipp, A. J., Co., Inc., 305 E. 47th St., New York 17, N. Y.
Lippincott & Margulies, Inc., 430 Park Ave., New York 22, N. Y.
Liquid Carbonic Corp., The, 3100 S. Kedzie Ave., Chicago 23, Ill.
Liquid-Tight Paper Container Assn., The, 1532 Lincoln-Liberty Bldg., Philadelphia 7, Pa.
Liquifoil Corp., 211 Woodworth Ave., Alma, Mich.
Litho Can Corp., 16th & Mickle Sts., Camden 2, N. J.
Lithographers' Finishing Co., 480 Canal St., New York 13, N. Y.
Lithographers National Assn., 420 Lexington Ave., New York 17, N. Y.
Lithographic Technical Foundation, Inc., 131 E. 39th St., New York 16, N. Y.
Little, H. C., Burner Co., Inc., Packaging Div., Woodland Ave. & DuBois Sts., San Rafael, Calif.
Livingston & Co., Inc., 468 West Broadway, New York 12, N. Y.
Lockwood Folding Box Co., 251-253 S. Third St., Philadelphia 6, Pa.
Loeb Equipment Supply Co., 819 Superior St., Chicago 22, Ill.
Loeber Limited, 18-19 Queenhithe, London, E.C.4, England
Loederer, Richard A., 67 W. 67th St., New York 23, N. Y.
Loewy, Raymond, Associates, 488 Madison Ave., New York 22, N. Y.
Logan Co., 201 Cabel St., Louisville 6, Ky.
Long Island Engraving Co., 19 W. 21st St., New York 10, N. Y.
Long Island Finishing Corp., 5-39—48th Ave., Long Island City 1, N. Y.
Longview Fibre Co., Longview, Wash.
Loomis Wadding Co., Inc., 1560 River St., Hyde Park, Mass.
Lord Baltimore Press, Inc., The, 1601 Edison Highway, Baltimore 13, Md.
Lorentz, Henry V., 148 E. Virginia St., San Jose, Calif.
Loroco Industries, Inc., 100 E. Benson St., Reading 15, Ohio
Los Angeles Paper Box & Board Mills, 2615 E. 12th St., Los Angeles 23, Calif.
Lotz, Abbott & Co. Ltd., 4 Vernon Place, London, W.C.1, England
Louden, Lillian, 818 Olive St., St. Louis 1, Mo.
Louden Machinery Co., The, 607 West Broadway, Fairfield, Iowa
Louisville Cooperage Co., 421 W. Avery St., Louisville, Ky.
Louisville Pottery Co., 228 E. Bloom St., Louisville 8, Ky.
•Lowe Paper Co., Ridgefield, N. J.
Loyal Press, 130 W. 26th St., New York 1, N. Y.
Lowery & Schwartz, 20 Vandam St., New York 13, N. Y.
Lucas, Mildred, 369 Lexington Ave., New York 17, N. Y.
Lucid Containers, 143 Greene St., New York 12, N. Y.
Ludlow Mfg. & Sales Co., 211 Congress St., Boston 5, Mass.
Lull, Mary, Gift Wrap, 1365 York Ave., New York 21, N. Y.
Lumelite Corp., Pawling, N. Y.
Lurie & Lurie, 126 N. Union Ave., Chicago 6, Ill.
Lurie Plastics, Inc., 1913 Blvd., Colonial Heights, Va.
•Lusteroid Container Co., Inc., 10 W. Parker Ave., Maplewood, N. J.
Lustig, Alvin, 132 E. 58th St., New York 22, N. Y.
Lustour Corp., 7 N. Brentwood Blvd., Clayton 5, Mo.
Lustra-Cite Industries, Inc., 249 W. 34th St., New York 1, N. Y.
Lutz & Sheinkman, 421 Hudson St., New York 11, N. Y.
•Lynch Corp., P. O. Box 271, Anderson, Ind.
Lyndhurst Chemical Corp., 85 Liberty St., Passaic, N. J.
Lyon Metal Products, Inc., 17 Montgomery St., Aurora, Ill.
Lyon-Raymond Corp., 143 Madison St., Greene, N. Y.
Lyttleton, Don, Packaging Machinery, 2502 Dunlavy St., Houston 6, Texas

M

M & C Products Co., 4917-21 Cottman St., Philadelphia 35, Pa.
M-H Standard Co., 516-518 Communipaw Ave., Jersey City 9, N. J.
M & R Manufacturing Co., 48 Blanche St., Mansfield, Ohio
•MRM Co., Inc., 191 Berry St., Brooklyn 11, N. Y.
Maas & Waldstein Co., 2121 McCarter Highway, Newark 4, N. J.
Mac Sim Bar Paper Co., 431 Helen Ave., Otsego, Mich.
MacAndrews & Forbes Co., Third & Jefferson Sts., Camden 4, N. J.

MacDonald Mfg. Co., 550 Green St., New Baltimore, Mich.
Machine O'Matic, Inc., 2045 N. Hoyne Ave., Chicago 47, Ill.
Machinery & Products Engineering Co., 3630 Frankford Ave., Philadelphia 34, Pa.
•Mack Molding Co., Wayne, N. J.
Maderite Paper Box Co., 95 Main St., Winsted, Conn.
Magers, Charles, 55 Mountain Ave., Princeton, N. J.
Magic City Bottle & Supply, 1380 N.W. 23rd St., Miami, Fla.
Magid-Robinson Co., Inc., 235 Fourth Ave., New York 3, N. Y.
Magill-Weinsheimer Co., 4545 Touhy Ave., Lincolnwood, Ill.
Magline, Inc., P. O. Box 55, Pinconning, Mich.
Magnolia Paper Co., Box Div., 1800 Glaser St., Houston, Texas
Maharam Fabric Corp., 130 W. 46th St., New York 36, N. Y.
Mailler Searles, Inc., 300 Seventh St., San Francisco 3, Calif.
Main Bros. Box & Lumber Co., Karnak, Ill.
Maine Machine Works, 1230 E. 109th St., Los Angeles 59, Calif.
Maine Potato Bag Co., Caribou, Maine
Majikweld Corp., 1324 Boston Road, New York 56, N. Y.
Malanco, Inc., 2200 W. 138th St., Blue Island, Ill.
Mammoth Paper Bags, 63-02——59th Ave., Maspeth 78, N. Y.
Manchester Boxes, Ltd., 100 Sterling Road, Toronto, Ont., Canada
Manchester Paper Board & Paper Co., Inc., Richmond 24, Va.
Mancuso Barrel & Co., Kenner, La.
Mandel Products Co., 207 Astor St., Newark 5, N. J.
Mangan & Eckland, 141 W. Jackson Blvd., Chicago 4, Ill.
•Manhasset Machine Co., 255 E. Second St., Mineola, L. I., N. Y.
Manhattan Paste & Glue Co., Inc., 425 Greenpoint Ave., Brooklyn 22, N. Y.
Manhattan Storage & Warehouse Co., 801 Seventh Ave., New York 19, N. Y.
Manion Steel Barrel Co., Oil City, Pa.
Mankato Paper Box Co., 726 S. Front St., Mankato, Minn.
Mann, Fred, & Co., Inc., 360 W. 50th St., New York 19, N. Y.
Mansfield Paper Box & Novelty Co., 184 Brooker Place, Mansfield, Ohio
Mantes, T. R., Co., 236 Fremont St., San Francisco 5, Calif.
Mantrose Corp., The, 136-146——41st St., Brooklyn 32, N. Y.
Manufacturers Box Co., 305 Railroad Ave., Bridgeport 4, Conn.
Manufacturers Engineering & Equipment Corp., York & Mill Roads, Hatboro, Pa.
Manufacturing Chemists Assn., Inc., 1625 Eye St., N.W., Washington 6, D. C.
Marac Machinery Corp., 1819 Broadway, New York 23, N. Y.
•Marathon Corp., Menasha, Wis.
Marbek, Inc., 1200 Manhattan Ave., Brooklyn 22, N. Y.
Marco Chemicals, Inc., 1711 Elizabeth Ave., W. Linden, N. J.
Mardon, Son & Hall Ltd., Temple Gate, Bristol 1, England
Marinette & Menominee Box Co., 111 Hosmer St., Marinette, Wis.
Markandy, Inc., 145 Grand Ave., Kirkwood 22, Mo.
•Markem Machine Co., 150 Congress St., Keene, N. H.
Market Forge Co., 35 Garvey St., Everett 49, Mass.
Marking Device Assn., 912 Chicago Ave., Evanston, Ill.
Markley, Margery, 253 E. 50th St., New York 22, N. Y.
Marks, Edward M., Co., 960 E. 61st St., Los Angeles 1, Calif.
Marohn, Lane, 180 Riverside Drive, New York 24, N. Y.
Marquardt & Co., Inc., 155 Spring St., New York 12, N. Y.
Marsh, George, 833 Park Sq. Bldg., Boston, Mass.
Marsh Stencil Machine Co., 707 East B St., Belleville, Ill.
Marshall Paper Tube Co., High St., Randolph, Mass.
Marshville Box Co., Marshville, N. C.
Martin Brothers Box Co., The, 39 Blucher St., Toledo 1, Ohio
Martin Paper Box Mfg. Corp., 346 Carroll St., Brooklyn 31, N. Y.
Martin, W. A. Gibson, Whinmoor Court, Sandfield Park, Liverpool 12, England
Martindell Molding Co., N. Olden & Sixth St., Trenton 8, N. J.
Martling, W. Lockwood, Jr., 6 W. Ontario St., Chicago 10, Ill.
Marvell Pharmacal Co., 55 W. 16th St., New York 11, N. Y.
Marvellum Co., The, 28 Appleton St., Holyoke, Mass.
Marvil Package Co., Hebron, Md.
Maryland Glass Corp., 2147-53 Wicomico St., Baltimore 16, Md.
Maryland Laminating Co., 184 W. Ostend St., Baltimore 30, Md.
Maryland Paper Box Co., Leadenhall & Ostend Sts., Baltimore 30, Md.
Maryland Plastics, Inc., 95 Madison Ave., New York 16, N. Y.
Mascherin, Caesar A., 15 Park Row, New York 38, N. Y.
Mason Box Co., The, 521 Mt. Hope St., No. Attleboro, Mass.
Mason Envelope Co., Inc., 536 Broadway, New York 12, N. Y.
Mason, F. E., & Sons, 999 Franklin St., Batavia, N. Y.
Mason & Foster, 2711 Dauer Rd., Midland, Mich.
Masonite Corp., 111 W. Washington St., Chicago 2, Ill.
Mason-Keller Corp., Harrison Ave., Roseland, N. J.
Massachusetts Plastic Corp., Ludlow, Mass.
Masta Displays, Inc., 230 W. 17th St., New York 11, N. Y.
Master Addresser Co., 6500 W. Lake St., Minneapolis 16, Minn.
Master Appliance Mfg. Co., Fourth & Ontario Sts., Racine, Wis.
Master Cartons, Inc., 3134 N. San Gabriel Blvd., So. San Gabriel, Calif.
Master-Kraft Fixture Co., The, 2320 Lipps Lane, Baltimore 23, Md.
Master Package Corp., The, Owen, Wis.
Master Paper Box Co., Inc., 1319 S. Michigan Ave., Chicago 5, Ill.
Master Plastic Molding Corp., 1216 S. Vandeventer St., St. Louis 10, Mo.
Mateer, G. Diehl, Co., Lincoln Highway, Stratford, Wayne, Pa.
Mathews Conveyor Co., Tenth St., Ellwood City 1, Pa.
Matthews, Jas. H., & Co., 3958 Forbes St., Pittsburgh 13, Pa.
•Matthias Paper Corp., 165 W. Berks St., Philadelphia 22, Pa.
Maurer, Sascha, Gaylordsville, Conn.
Mautner Co., Inc., The, 580 Fifth Ave., New York 36, N. Y.
Maxson Automatic Machinery Co., 98 Granite St., Westerly, R. I.
Maxwell Brothers, Inc., 2300 S. Morgan St., Chicago 8, Ill.
Mayfair Sales Co., 424 Central Ave., Cheltenham, Pa.
Mayflower Electronic Devices, Inc., 6014 Hudson Blvd., West New York, N. J.
Mayhew, J. H., Co., The, 340 Highway #7, Excelsior, Minn.
McCambridge Packaging Equipment Co., 4845 N. Paulina St., Chicago 40, Ill.
McCandlish Lithograph Corp., Roberts Ave., & Stokley St., Philadelphia 29, Pa.
McCarthy-Root, Div. Jefferson Box & Mfg. Co., 4300 W. Jefferson Ave., Detroit 9, Mich.
McClintock Corp., The, 1550 Vernon St., Harrisburg, Pa.
McClintock Manufacturing Co., 2700 S. Eastern Ave., Los Angeles 22, Calif.
McCowat-Mercer Press, Inc., 202 Bolivar St., Jackson 1, Tenn.
McCoy Label Co., Inc., 608 Commercial St., San Francisco 11, Calif.
McCoy Paper Converters, 3rd & Huntingdon Sts., Philadelphia 33, Pa.
McCreary Motto Co., 219 N. Fourth St., Cambridge, Ohio
McCutcheon Bros. & Quality, Inc., 2653 N. Reese St., Philadelphia 33, Pa.
McDonald Printing Co., Inc., Arbor Place, Cincinnati 8, Ohio
McGill Co., 501 Park Ave., Minneapolis 15, Minn.
McGuire & Co., 833——47th Ave., Oakland 1, Calif.
McKay Chemical Co., Inc., 880 Pacific St., Brooklyn 38, N. Y.
McKay-Davis Chemical Corp., 328 N. Westwood Ave., Toledo, Ohio
McKenzie Service, Inc., 95 Morton St., New York, N. Y.
McLaurin-Jones Co., Mill St., Brookfield, Mass.
McNeill Cooperage Co., Rahway, N. J.
McVaugh, William, Jr., 129 South Broadway, Pendleton, Ind.
Mead Board Sales, Inc., 3347 Madison Road, Cincinnati 9, Ohio
•Mead Corp., The, 118 W. First St., Dayton 2, Ohio
Mead Sales Co., The, 816 Public Ledger Bldg., Philadelphia 6, Pa.
Mealey, R. J., Corp., 51 States St., San Francisco 14, Calif.
Mechanical Handling Systems, Inc., 4600 Nancy Ave., Detroit 12, Mich.
Meehan, J. E., Co., 3311 N. Cicero Ave., Chicago 41, Ill.
Meehan-Tooker Co., Inc., The, 160 Varick St., New York 13, N. Y.
Mehl Mfg. Co., 2057 Reading Road, Cincinnati 2, Ohio
Meisel Press Mfg. Co., 944 Dorchester Ave., Boston 25, Mass.
Mele Mfg. Co., Inc., 366 Fifth Ave., New York 1, N. Y.
Melind, Louis, Co., 3524 N. Clark St., Chicago 13 Ill.
Melker, A. R., Co., 110 E. 42nd St., New York 17, N. Y.
•Melrose Packaging, 814 St. Ann's Ave., New York 56, N. Y.
Mengel Co., The, 1111 Zane St., Louisville, Ky.
Mercer Oil & Chemical Co., Inc., 7th & Fishers Ave., Philadelphia 20, Pa.
Mercer Paper Tube, Inc., 650 W. Ingham Ave., Trenton 5, N. J.
Merchandiser Press, Inc., 127 Seventh Ave., New York 11, N. Y.
Merchants Box Co., 230 Fifth Ave., New York 1, N. Y.
Merchants Chemical Co., The, 55 Days St., So. Norwalk, Conn.
Mercury Conveyor, Inc., 365 Broadway, Hillsdale, N. J.
•Mercury Engineering Corp., 2100 N. Farwell Ave., Milwaukee 2, Wis.
•Mercury Heat Sealing Equipment Co., 2601-21 N. Howard St., Philadelphia 33, Pa.
Mercury Manufacturing Co., 4044 S. Halsted St., Chicago 9, Ill.
Merendino-Greene, 476 S. Pasadena Ave., Pasadena 2, Calif.
Merit Container Corp., 799 Washington St., New York 14, N. Y.
Merit Displays Co., McLean Blvd. at E. 26th St., Paterson 4, N. J.

Merrick Transparent Container Co., 95-30 ——150th St., Jamaica 4, N. Y.
Metal Box Co., Ltd., The Langham, Portland Place, London W.1, England
Metal Closures Ltd., Bromford Lane, West Bromwich, Staffs, England
Metal Film Co., 200 Fifth Ave., New York 10, N. Y.
Metal Industries, Inc., 1420 E. 20th St., Indianapolis 7, Ind.
Metaline Products Co., Inc., 101 N. Feltus St., So. Amboy, N. J.
Metalite, Inc., 381 E. Main St., Meriden, Conn.
Metro Glass Co., Inc., 107 West Side Ave., Jersey City 3, N. J.
Metropolitan Envelope Service, 42 E. 23rd St., New York 10, N. Y.
Metropolitan Paper & Box Co., 3459 S. Western St., Los Angeles 47, Calif.
Metropolitan Watch Material Importing Co., 200 W. 72nd St., New York, N. Y.
Metzgar Co., 412 Douglas St., Grand Rapids 4, Mich.
Metzig, William, 331 Madison Ave., New York 17, N. Y.
Meyer-Clement, Inc., 315 N. Euclid Ave., Oak Park, Ill.
Meyer, Geo. J., Mfg. Co., Meyer & Dumore Sts., Cudahy, Wis.
Meyercord Co., The, 5323 W. Lake St., Chicago 44, Ill.
Miami Valley Coated Paper Co., Franklin, Ohio
•Michigan Carton Co., 79 E. Fountain St., Battle Creek, Mich.
Michigan Collapsible Tube Co., 23150 Schoenherr Road, East Detroit, Mich.
Michigan Lithographing Co., 1-9 Carlton Ave., S.E., Grand Rapids 6, Mich.
Michigan Paper Tube & Can Co., Flat Rock, Mich.
Micro Switch, Div. Minneapolis-Honeywell Regulator Co., Freeport, Ill.
Mid-America Plastics, Inc., 2394 Canal Road, Cleveland 13, Ohio
Middle West Display & Sales Co., 1635 W. Melrose St., Chicago 13, Ill.
•Middlesex Paper Tube Co., Inc., 345 Chelmsford St., Lowell, Mass.
Middlesex Products Corp., 111 Putnam Ave., Cambridge 39, Mass.
Midland Adhesive & Chemical Corp., 2600 Goodrich St., Ferndale 20, Mich.
Midland Container Corp., 827 Koeln Ave., St. Louis 11, Mo.
Mid-States Gummed Paper Co., 2515 S. Damen Ave., Chicago 8, Ill.
Mid-States Rubber Products, Inc., 221 E. Maxwell Ave., Evansville, Ind.
Mid-States Steel & Wire Co., 510 S. Oak St., Crawfordsville, Ind.
Midway Machine Co., 2324 University Ave., St. Paul 4, Minn.
Mid-West Bottle Cap Co., Belvidere, Ill.
Mid-West Waxed Paper Co., Fort Madison, Iowa
Midwest Foil Co., 500 E. Main St., Louisville 2, Ky.
Midwest Plastic Products Co., 1801 Chicago Rd., Chicago Heights, Ill.
Miehle Printing Press & Mfg. Co., 2011 Hastings St., Chicago 8, Ill.
Miller, Arthur, Adhesives Co., 246 Fifth Ave., New York 1, N. Y.
Miller, George F., & Associates, 8800 S. Vincennes Ave., Chicago 20, Ill.
Miller Label Co., 4006 Pacific Ave., Tacoma 8, Wash.
Miller Mfg. Co., Inc., Richmond, Va.
Miller & Miller, Inc., 136 Marietta St., Atlanta 1, Ga.
Miller Paper Co., 80 Wooster St., New York 12, N. Y.
Miller Printing Machinery Co., 1101-1131 Reedsdale St., Pittsburgh 33, Pa.
Miller-Robinson Co., 7007 Avalon St., Los Angeles 3, Calif.
Miller, T. R., Mill Co., Inc., Brewton, Ala.
•Miller, Walter P., Co., Inc., 452 York Ave., Philadelphia 23, Pa.
Miller Wrapping & Sealing Machine Co., 18 S. Clinton St., Chicago 6, Ill.
Millhiser Bag Co., Inc., 600 State St., Richmond 9, Va.
Milpaco, Inc., 1065 N. Clinton Ave., Rochester 21, N. Y.
•Milprint, Inc., 4200 N. Holton St., Milwaukee 11, Wis.
Milton, George A., Can Co., Inc., 131 N. 14th St., Brooklyn 11, N. Y.
Milwaukee Industrial Designers, 744 N. Fourth St., Milwaukee 3, Wis.
Milwaukee Label & Seal Co., 261 E. Erie St., Milwaukee 2, Wis.
Minden Paper Gauge Co., 230 W. 41st St., New York 36, N. Y.
Minerva Wax Paper Co., Grant St., Minerva, Ohio
Minneapolis-Honeywell Regulator Co., 2753 Fourth Ave., Minneapolis 8, Minn.
Minneapolis Sewing Machine Co., 4865 N. Osseo Road, Minneapolis 12, Minn.
Minnesota Filler Co., 9th Ave. & 9th St., S.E., Minneapolis 14, Minn.
Minnesota Mining & Mfg. Co., 900 Fauquier Ave., St. Paul 6, Minn.
Mion Mfg. Co., Inc., 406 Marquette Bldg., Detroit 26, Mich.
•Miro Container Corp., Inc., 557 DeKalb Ave., Brooklyn, N. Y.
Mirro-Products Co., Tate St., High Point 2, N. C.
Miskella Infra-Red Co., The, E. 73rd & Grand Ave., Cleveland 4, Ohio
Mitchell Paper Products Co., 350 Hoover Ave., Bloomfield, N. J.
Model Box Co., 2400-2408 Penn Ave., Pittsburgh 22, Pa.
Model Engraving Corp., 1422 Grand St., Hoboken, N. J.
Model Printing Equipment Corp., 1422 Grand St., Hoboken, N. J.
Modern Art Printing Co., 34-36——56th St., Woodside 77, L. I., N. Y.
Modern Boxes, Inc., 4949 N. Pulaski Road, Chicago 30, Ill.
Modern Color Process Co., Inc., 693 Portland Ave., Rochester 21, N. Y.
Modern Containers, Inc., 4500 E. Dunham St., Los Angeles 23, Calif.
Modern Containers Ltd., P. O. Box 35, Station H, Toronto 13, Canada
Modern Decorating Co., 155-165 Oxford St., Paterson, N. J.
Modern Engraving & Machine Co., 1413 Chestnut Ave., Hillside 5, N. J.
Modern Equipment Co., P. O. Box 3596, Greenville, S. C.
Modern Equipment Co., Inc., 2011 Cuming St., Omaha 2, Neb.
Modern Folding Carton Corp., 102 Kane St., Brooklyn 2, N. Y.
Modern Machinists, 774 Girard St., N.W., Washington 1, D. C.
Modern Packages, Inc., 4500 E. Dunham St., Los Angeles 23, Calif.
Modern Paper Box Mfg. Co., 110 W. Oxford St., Philadelphia 22, Pa.
Modern Plastic Machinery Corp., 15 Union St., Lodi, N. J.
Modern Plastics Corp., 489 N. Shore Drive, Benton Harbor, Mich.
Modern Transparent Mfg. Co., Inc., 107 Hickory St., Scranton, Pa.
Modglin Co., Inc., 3235 San Fernando Rd., Los Angeles 65, Calif.
Moebius Printing Co., 300 N. Jefferson St., Milwaukee 2, Wis.
Moellenbrock & Wilke, 204 Jefferson St., Washington, Mo.
Mohawk Containers, Inc., Box 518, New Hartford, N. Y.
Mohlman, G. A., 110 Washington Place, New York 14, N. Y.
•Mojonnier Associates, Inc., 9151 Fullerton Ave., Franklin Park, Ill.
Molded Insulation Co., 335 E. Price St., Philadelphia 44, Pa.
Molded Products, Div. Admiral Corp., Washington St. & Creamery Rd., West Chicago, Ill.
Molitor Box Co., 500 W. Florida St., Milwaukee 11, Wis.
Monaplastics, Inc., Branchville Road, Georgetown, Conn.
Monarch Plastic Products Co., 1801 N. Marshall St., Milwaukee, Wis.
Monk, C. O., of Maryland, Inc., 212 N. Bentalou St., Baltimore 23, Md.
Monmouth Container Corp., The, Harrison Ave., Matawan, N. J.
Monogram of California, 2500——18th St., San Francisco 10, Calif.
Mono-Sol Corp., 407 County Line Road, Gary, Ind.
•Monsanto Chemical Co., 440 Monsanto Ave., Springfield 2, Mass.
•Monsanto Chemical Co., 800 N. 12th St., St. Louis, Mo.
Moonglow Novelty Corp., 959 Whittier St., New York 59, N. Y.
Moore, George Arlington, 230 E. 48th St., New York 17, N. Y.
Moore, Kenneth J., & Co., 1778 Estes Ave., Chicago 26, Ill.
Moore & Munger, 33 Rector St., New York 6, N. Y.
Morart Gravure Corp., 7 Bridge St., Holyoke, Mass.
Mor-Gan Laminating & Foliating Co., 333 Sixth Ave., New York 14, N. Y.
Morningstar Corp., The, 156 Sixth St., Cambridge 42, Mass.
Morningstar, Nicol, Inc., 630 W. 51st St., New York 19, N. Y.
Morrill, Geo. H., Co., Div. Sun Chemical Corp., 10-10——44th Ave., Long Island City 1, N. Y.
Morrill Press, The, 215 Cayuga St., Fulton, N. Y.
•Morris Paper Mills, 135 S. LaSalle St., Chicago 3, Ill.
Morse Decals, Inc., 1213 E. 14th St., Los Angeles 21, Calif.
Moser Bag & Paper Co., 3049 E. 55th St., Cleveland 27, Ohio
Moskowitz, Jack, Displays, 675 Hudson St., New York 14, N. Y.
Moslo Machinery Co., 2443 Prospect Ave., Cleveland 15, Ohio
•Mosstype Corp., 33 Flatbush Ave., Brooklyn 17, N. Y.
Mosstype Roller Co., Inc., 15 Franklin Turnpike, Waldwick, N. J.
Moto-Truc Co., The, 1953 E. 59th St., Cleveland 3, Ohio
Motson, J. Frank, Co., 1717 Bethlehem Pike, Flourtown, Pa.
Mott Carton & Paper Co., 2226 Eugenia St., St. Louis, Mo.
Motter's, George F., Sons, 132 S. Pershing Ave., York, Pa.
Mount Joy Paper Box Co., 292 W. Main St. Mount Joy, Pa.
Mountain Waterproof Papers, Inc., Kansas St., Worcester 1, Mass.
Mousley, Geo. E., Inc., Quidnick St., West Warwick, R. I.
Moyer & Pratt, Inc., Lyons Falls, N. Y.
Mueller Can & Tube Co., 293 Como Ave., St. Paul 3, Minn.
Muirson Label Co., Inc., 435 Stockton Ave., San Jose 26, Calif.
Muller-Munk, Peter, Associates, 725 Liberty Ave., Pittsburgh 22, Pa.
Mullery Paper Packages, Inc., 293 Como Ave., St. Paul 3, Minn.
Mulligan, James, Printing Co., 1808 Washington Ave., St. Louis 3, Mo.
Multi Color Graph Co., 186 Summit Ave., Jersey City 4, N. J.
Multicolor Gravure Corp., 29 N. Maple St., Florence, Mass.
Multi-Colortype Co., 4575 Eastern Ave., Cincinnati 26, Ohio

Multistamp Co., The, 527 W. 21st St., Norfolk 1, Va.
Mundet Cork Corp., 7101 Tonnelle Ave., No. Bergen, N. J.
Munising Paper Co., The, 135 S. LaSalle St., Chicago 3, Ill.
Munson Bag Co., The, 1366 W. 117th St., Cleveland 7, Ohio
Murnane Paper Co., 1510 N. Kostner Ave., Chicago 51, Ill.
Musto Paper Box Co., 1312—13th St., No. Bergen, N. J.
Mutual Box Board Co., 1532 Erie St., Utica, N. Y.
Mutual Paper Box Corp., 1500 W. Harrison St., Chicago 7, Ill.
Mutual Plastic Mold Co., 5141 Firestone Place, South Gate, Calif.
Mygatt, L. T., 135 E. Plumstead Ave., Lansdowne, Pa.
Myron Manufacturing Corp., 239 Fourth Ave., New York 3, N. Y.
Mystik Adhesive Products, 2635 N. Kildare Ave., Chicago 39, Ill.

N

Nalle Plastics, Inc., 108-12 W. Second St., Austin 1, Texas
Namco Machinery, Inc., 54 Kosciusko St., Brooklyn 5, N. Y.
Nanuet Valve Co., Inc., Route 59, Nanuet, N. Y.
Nash, Jim, 405 E. 54th St., New York 22, N. Y.
Nashua Corp., 44 Franklin St., Nashua, N. H.
Nashua Paper Box Co., 9 River St., Nashua, N. H.
Nasko Machinery Corp., 3545 E. Seven Mile Road, Detroit 34, Mich.
National Adhesives (Canada) Ltd., 371 Wallace Ave., Toronto, Ont., Canada
National Adhesives, Div. National Starch Products, Inc., 270 Madison Ave., New York 16, N. Y.
National Assn. of Display Industries, 203 N. Wabash Ave., Chicago 1, Ill.
National Assn. of Frozen Food Packers, 1415 K St., N.W., Washington, D. C.
National Assn. of Glue Manufacturers, 55 W. 42nd St., New York 36, N. Y.
National Assn. Printing Ink Makers, Inc., 1440 Broadway, New York 23, N. Y.
National Assn. of Sanitary Milk Bottle Closure Mfrs., 1532 Lincoln-Liberty Bldg., Philadelphia 7, Pa.
National Barrel & Drum Assn., Inc., 1025 Connecticut Ave., N.W., Washington 6, D. C.
National Bread Wrapping Machine Co., W. Chestnut St., East Longmeadow, Mass.
National Bundle Tyer Co., Blissfield, Mich.
•National Can Corp., 3217 W. 47th Place, Chicago 32, Ill.
National Canners Assn., 1133—20th St., N.W., Washington 6, D. C.
National Carton & Label Corp., 406 Mystic Ave., Somerville, Mass.
National Casein Co., 601 W. 80th St., Chicago 20, Ill.
National Collapsible Tube Co., 405 Carpenter St., Providence 9, R. I.
National Confectioners' Assn., 221 No. LaSalle St., Chicago, Ill.
National Consumer-Retailer Council, Inc., 1860 Broadway, New York, N. Y.
•National Container Corp., 7 Central Park West, New York 23, N. Y.
National Distillers Products Corp., Box #373, Memphis, Tenn.
•National Equipment Corp., 153-157 Crosby St., New York 12, N. Y.
National Fibre Can & Tube Assn., 41 E. 42nd St., New York 17, N. Y.
National Flexible Packaging Assn., 850 Euclid Ave., Cleveland 14, Ohio
National Foil Co., 913 Newark Ave., Elizabeth 3, N. J.
•National Folding Box Co., Inc., Sub. Federal Paper Board Co., Inc., 405 Lexington Ave., New York 17, N. Y.
National Food Distributors' Assn., 100 E. Ohio St., Chicago, Ill.
National Forge & Ordnance Co., Front St., Irvine, Pa.
National Instrument Co., 2701 Rockwood Ave., Baltimore 15, Md.
National Label Co., 19th St. & Indiana Ave., Philadelphia 19, Pa.
National Laboratories & Mfg. Corp., 233 Chestnut St., Ridgewood, N. J.
National Meat Canners Assn., 59 E. Van Buren St., Chicago, Ill.
National Metal Edge Box Co., Callowhill at 12th St., Philadelphia 23, Pa.
National Paint, Varnish & Laquer Assn., 1500 Rhode Island Ave., N.W., Washington, D. C.
National Pallet Corp., Oliver Building, Pittsburgh 22, Pa.
National Paper Box Manufacturers Assn., 1101 LibertyTrust Bldg., Broad & Arch Sts., Philadelphia 7, Pa.
National Paper Box Manufacturing Co., Second & Somerset Sts., Philadelphia 33, Pa.
National Paper Can & Tube Co., 401 S. 7th St., Milwaukee 4, Wis.
National Paperboard Assn., 80 E. Jackson Blvd., Chicago 4, Ill.
National Petro-Chemicals Corp., P. O. Box 109, Tuscola, Ill.
National Printing Ink Corp., 123 N. Sangamon St., Chicago 7, Ill.
•National Rubber Machinery Co., 47 W. Exchange St., Akron 8, Ohio
National Rubber Stamp Works, 7 E. 48th St., New York 17, N. Y.
National Seal Corp., 316 W. 16th St., Erie, Pa.
National Spangle Corp., 307 W. 38th St., New York 11, N. Y.
National Steel Container Corp., 6700 S. Leclaire St., Chicago, Ill.
National Tin Can Manufactory Co., Inc., 134 W. Third St., New York 12, N. Y.
National Transparent Mfg. Co., 28 W. 25th St., New York 10, N. Y.
National Transparent Plastics Co., 51 Front St., Indian Orchard, Mass.
National Vacuum Molding Corp., 900 Nepperhan Ave., Yonkers, N. Y.
National Waterproof Papers, Inc., Van Rossum & Railroad Aves., Beverly, N. J.
National Wax Co., 1300 W. Division St., Chicago 22, Ill.
National Wholesale Druggists Assn., 330 W. 42nd St., New York 36, N. Y.
National Wooden Box Assn., Barr Bldg., Washington 6, D. C.
National Wooden Box Assn., 55 New Montgomery St., San Francisco 5, Calif.
National Wooden Pallet Manufacturers Assn., Room 215, Barr Bldg., Washington 6, D. C.
Naugatuck Chemical Div., U. S. Rubber Co., Naugatuck, Conn.
Nebel Paper Products Co., 1903 Liberty Life Building, Charlotte, N. C.
Neher-Whitehead & Co., 2018 Washington St., St. Louis, Mo.
Nelke Sign Mfg. Co., Inc., 115 Worth St., New York, N. Y.
Nelson, B. F., Mfg. Co., 401 N.E. Main St., Minneapolis 13, Minn.
Nelson Co., The, 1015 Standard Oil Bldg., Baltimore 2, Md.
Nelson, George, & Associates, 30 W. 57th St., New York, N. Y.
Nelson Label Machine Corp., 679 Frelinghuysen Ave., Newark 5, N. J.
Neo Products Co., 2534-38 S. Kedzie Ave., Chicago 23, Ill.
Neostyle, Inc., 2191 Cole St., Birmingham, Mich.
Nesbitt Associates, 48 W. 48th St., New York 36, N. Y.
Nesco, Div. New York Shipbuilding Corp., 1100 Niedrinhaus Ave., Granite, Ill.
Neubauer, Robert G., Inc., 234 Greenfield St., Bridgeport 5, Conn.
Neuman, J. John, Engineering & Mfg. Co., Yorktown Heights, N. Y.
Neva-Clog Products, Inc., 506 Logan St., Bridgeport 1, Conn.
Nevins Co., The, 800 State Highway #3, Clifton, N. J.
New Cumberland Box Co., 119 Bridge St., New Cumberland, Pa.
New England Card & Paper Co., Inc., 20 Hanover St., Springfield 5, Mass.
New England Container Co., Meadow St., Chicopee, Mass.
•New Era Mfg. Co., 375 Eleventh Ave., Paterson 4, N. J.
New Haven Board & Carton Co., The, 259 East St., New Haven 8, Conn.
New Jersey Cellophane Bag Co., 175 Clinton Place, Newark 8, N. J.
New Jersey Electronic Co., 33 Leonard Place, Passaic, N. J.
•New Jersey Machine Corp., 16th St. & Willow Ave., Hoboken, N. J.
New Jersey Partition & Box Co., Inc., 111-113 Ogden St., Newark 4, N. J.
New Jersey Transparent Co., 175 Clinton Place, Newark 8, N. J.
New Wrinkle, Inc., 1771 Springfield St., Dayton 3, Ohio
New York Corrugated Box Co., 175 Greene St., New York 12, N. Y.
New York Foil Products, 261 W. 125th St., New York 27, N. Y.
New York Label & Box Corp., 275 Seventh Ave., New York 1, N. Y.
New York Testing Laboratories, Inc., 80 Washington St., New York 6, N. Y.
Newark Glassine Bag Co., 50 Jelliff Ave., Newark 8, N. J.
Newark Paper Box Co., 216-228 High St., Newark 2, N. J.
Newark Paraffine & Parchment Paper Co., 50 Jelliff Ave., Newark 8, N. J.
Newburgh Paper Box Co., Inc., 80-88 S. Colden St., Newburgh, N. Y.
Newth-Morris Box Corp. of Tenn., Box 227, Milan, Tenn.
Newton, Jack B., 60 Gramercy Park, N., New York 10, N. Y.
Niagara Box Factory, Inc., 710-714 E. 13th St., New York 9, N. Y.
Niagara Corrugated Container Co., Inc., 523 Cornwall Ave., Buffalo 15, N. Y.
Niagara Filter Corp., 3080 Main St., Buffalo 14, N. Y.
Niagara Packaging Machinery Corp., 28 St. Mary St., Depew, N. Y.
Nichols Paper Products Co., 615 Willow St., Green Bay, Wis.
Nickelsen, John, 155-17 Sanford Ave., Flushing 55, N. Y.
Nicol, Malcolm, & Co., 39 Utter Ave., Hawthorne, N. J.
Niedringhaus Metal Products Co., 5735 Natural Bridge Ave., St. Louis 20, Mo.
Nielsen, William R., Highland Road, Westport, Conn.
•Niemand Bros., Inc., 37-11—35th Ave., Long Island City 1, N. Y.
Nixon Nitration Works, Nixon, N. J.
Noble, F. H., & Co., 535-559 W. 59th St., Chicago 21, Ill.
Noon Bag Co., P. O. Box 3876, Portland, 9, Ore.
Norben, Inc., 1200 W. 28th St., Indianapolis, Ind.
Norco Manufacturing Co., 392 Bleecker St., New York, N. Y.
Normandie Press, Inc., 350 W. Fourth St., New York 14, N. Y.
Norris, James A., Co., 392 Bleecker St., New York 14, N. Y.

Norristown Box Co., Markley St., Norristown, Pa.
North, Charles N., 381 Fourth Ave., New York 16, N. Y.
Northeastern Plastics, Inc., 215 A St., Boston 10, Mass.
Northern Adhesives, Inc., 83 Apollo St., Brooklyn 22, N. Y.
Northern Container Corp., 21-09 Borden Ave., Long Island City 1, N. Y.
Northern Cooperage Div., Greif Bros. Cooperage Corp., Concord & Page Sts., St. Paul 7, Minn.
Northern Electric Co., 5224 N. Kedzie Ave., Chicago 25, Ill.
Northern Glass Co., 118 Sacramento St., San Francisco 11, Calif.
Northern Industrial Chemical Co., 7 Elkins St., So. Boston 27, Mass.
Northgrave Limited, 183 Bathurst St., Toronto, Ont., Canada
Northwestern Corrugated Box Co., 1821 N.E. Marshall St., Minneapolis 18, Minn.
Northwestern Glass Co., 5801 East Marginal Way, Seattle 4, Wash.
Northwestern Paper Box Co., Inc., 3131 Western Ave., Seattle 1, Wash.
Norton Co., 1 New Bond St., Worcester 6, Mass.
Norton Laboratories, Inc., 520 Mill St., Lockport, N. Y.
Norwalk Paper Box Co., The, 50 Newton St., Norwalk, Ohio
Nosco Plastics, Inc., Box #269, Erie, Pa.
Novel Enterprises, 410 Third Ave., Brooklyn 15, N. Y.
Nox-Rust Div., Daubert Chemical Co., 333 N. Michigan Ave., Chicago 1, Ill.
Nugent-Graham Studios, 415 N. Dearborn St., Chicago 14, Ill.
Nussbaum Novelty Co., 269 S. Jefferson St., Berne, Ind.
Nutting Truck & Caster Co., 1201 W. Division St., Fairibault, Minn.
Nylco Products, Inc., 530 Main St., Clinton, Mass.

O

Oak Printing Co., 13200 Enterprise Ave., Cleveland 11, Ohio
Oakwood Products Co., Narragansett, R. I.
Obear Nester Glass Co., 20th & Broadway, East St. Louis, Ill.
Oberly & Newell Lithograph Corp., 545 Pearl St., New York 7, N. Y.
O'Brien, J. M., & Co., 603 Boylston St., Boston 16, Mass.
O'Connor Paper Box Co., 1106 N. Mariposa Ave., Hollywood 29, Calif.
Ogle, R. W., & Co., 3440 Wilshire Blvd., Los Angeles 5, Calif.
Ohio Bag Corp., 1400 Ed. L. Grant Highway, New York 52, N. Y.
•Ohio Boxboard Co., The, Rittman, Ohio
Ohio Lithographing Co., Toledo, Ohio
Ohio Packaging Co., 3486 E. 142nd St., Cleveland 20, Ohio
Ohio Paper Products Co., The, 346—11th St. S.E., Massillon, Ohio
•Oil Equipment Laboratories, Inc., 600 Pearl St., Elizabeth 4, N. J.
Oker, Joseph, Sons Co., The, 420 Findlay St., Cincinnati, Ohio
Olach-Inc., 2525 W. Moffat St., Chicago 47, Ill.
•Old Dominion Box Co., Inc., 528 Turner Ave., Charlotte 8, N. C.
Old Empire, Inc., Mt. Prospect & Verona Aves., Newark 4, N. J.
Old English Printing & Label Co., 1634 Arch St., Philadelphia 3, Pa.
Oldmill Paper Products Corp., 33rd St. & Skillman Ave., Long Island City 1, N. Y.
•Olin Mathieson Chemical Corp., Film Div., 655 Madison Ave., New York 21, N. Y.
Olive Can Co., 450 N. Leavitt St., Chicago 12, Ill.
Oliver Corp., The, A. B. Farquhar Div., 142 N. Duke St., York, Pa.
•Oliver Machinery Co., 445 6th St., N.W., Grand Rapids, Mich.
Olofsson Corp., The, 2727 Lyons Ave., Lansing 2, Mich.
Olsen, Andrew P., 919 N. Michigan Ave., Chicago 11, Ill.
Olsen, Tinius, Testing Machine Co., Easton Road, Willow Grove, Pa.
•Olsenmark Corp., 124 White St., New York 13, N. Y.
Olson, Samuel, Mfg. Co., Inc., 2418 Bloomingdale Ave., Chicago 47, Ill.
Olympic Plastics Co., Inc., 5471 West Jefferson Blvd., Los Angeles 16, Calif.
O'Malley, M. J., Co., The, 224 Franklin St., Springfield 1, Mass.
•Oneida Paper Products, Inc., 10 Clifton Blvd., Clifton, N. J.
O'Neill, William, 11 E. 44th St., New York, N. Y.
Oppa, E. T., 51 E. 42nd St., New York 17, N. Y.
Oppenheim Co., 55 W. 42nd St., New York 36, N. Y.
Opticase Co., The, 150 Dickerson St., Newark 7, N. J.
Orange County Box Co., Robertson Drive, Middletown, N. Y.
Orangeville Mfg. Co., Orangeville, Pa.
Orchard Paper Co., 3914 N. Union Blvd., St. Louis 15, Mo.
Oris Mfg. Co., Inc., Jackson St., Thomaston, Conn.
Orkin Institute of Industrial Sanitation, 713 W. Peachtree St., Atlanta, Ga.
Ormsby, James W., Inc., 301 E. 38th St., New York 16, N. Y.
Otsego Falls Paper Mills, Otsego, Mich.
Ottawa River Paper Co., Matzinger Road, Toledo, Ohio
Otto, Carl, 745 Fifth Ave., New York, N. Y.
Outserts, Inc., 11 W. 42nd St., New York 36, N. Y.
Owens-Corning Fiberglas Corp., 598 Madison Ave., New York 22, N. Y.
•Owens-Illinois Glass Co., P. O. Box 1035, Toledo 1, Ohio
Owens Paper Box Co., P. O. Box 1577, Wichita 7, Kansas
Oxford Paper Co., 230 Park Ave., New York 3, N. Y.
•Oxy-Dry Sprayer Corp., 320 S. Marshfield St., Chicago 12, Ill.

P

P M Industries, Inc., 280 Fairfield Ave., Stamford, Conn.
P. N. R. Corp., 4500 Euclid Ave., Cleveland 3, Ohio
Pabich, W. R., Mfg. Co., Inc., 2855 N. Rockwell St., Chicago 18, Ill.
Pacific Can Co., 290 Division St., San Francisco 3, Calif.
Pacific Coast Foil Co., Div. Jorgenson & Co., 500 Sansome St., San Francisco 11, Calif.
Pacific Label Co., 1231 S. Main St., Los Angeles 15, Calif.
Pacific Paper Box Co., 3615 Broadway Place, Los Angeles 7, Calif.
Pacific Paper Box Co., Inc., 2700 S.E. Ankeny St., Portland 15, Ore.
Pacific Ports Industries, Inc., 10901 Russett St., Oakland 3, Calif.
Package Advertising Co., 230 Park Ave., New York 17, N. Y.
Package Consultants, Inc., 1060 Myrtle Ave., Brooklyn 6, N. Y.
Package-Craft, Inc., 22 Morton St., Paterson 3, N. J.
Package Designers Council, 12 E. 46th St., New York 17, N. Y.
Package Engineering Co., 1951 Champa St., Denver 5, Colo.
•Package Machinery Co., East Longmeadow Post Office, Springfield, Mass.
Package Materials Laboratories, Inc., 461 Crescent Road, Hatboro, Pa.
Package Products Co., Inc., 1928 Camden Road, Charlotte 3, N. C.
Package Promotions Sales Corp., 5235 Avondale Ave., Chicago 30, Ill.
Package Supply Co., 135 E. Plumstead Ave., Lansdowne, Pa.
Packageers Co., 500 No. Dearborn St., Chicago 10, Ill.
Packageneers, Box 364, RR 1, Foster, Ohio
Packaging Arts, Inc., Washington Ave., So. Jamesport, L. I., N. Y.
Packaging Corp. of America, 4101 W. Parker Ave., Chicago 39, Ill.
Packaging Engineering Co., 5333 No. Cahuenga Blvd., North Hollywood, Calif.
Packaging Films, Inc., 74 Grand St., New York 13, N. Y.
Packaging Industries, 50 Church St., Montclair, N. J.
Packaging Institute, Inc., 342 Madison Ave., New York 17, N. Y.
Packaging Machinery Mfrs. Institute, Inc., 342 Madison Ave., New York 17, N. Y.
Packaging Materials Corp., 104 E. 40th St., New York 16, N. Y.
Packaging Pioneers, Inc., P. O. Box 203, Tuckahoe 7, N. Y.
Packaging Products, Inc., 111 W. Fifth St., Kansas City 5, Mo.
Packaging Service, Div. of Summit Corp., 100 W. Poplar St., Scranton 2, Pa.
•Packaging Service Corp., 7602 S. Greenwood Ave., Chicago 19, Ill.
Packard Container Corp., 226 Grand St., Hoboken, N. J.
•Packer Machinery Corp., 30 Irving Place, New York 3, N. Y.
Packers' Pal, 2500 N. Pulaski Road, Chicago 39, Ill.
Packets Products Corp., 88 Gerrish Ave., Chelsea 50, Mass.
Pack-It, 7 Brown St., Newark 5, N. J.
Packmasters, 1056 Home Ave., Akron 10, Ohio
•Pack-Rite Machines, 407 E. Michigan St., Milwaukee 1, Wis.
Pacon Products Corp., 501 Fifth Ave., New York 17, N. Y.
Pac-U-Craft, 1947 Broadway, New York 23, N. Y.
Pad-Y-Wax Co., Inc., The, 25 Broadway, New York 4, N. Y.
Paige, Richard E., Inc., 114 E. 32nd St., New York 16, N. Y.
•Paisley Products, Inc. Div. of Morningstar, Nicol, Inc., 630 W. 51st St., New York 19, N. Y.
•Paket, Inc., 9022 Baltimore St., Chicago 17, Ill.
•Pak-Rapid, Inc., 530 N. 21st St., Philadelphia 30, Pa.
Pak-Rite Flexible Packaging Co., 135 W. 20th St., New York 11, N. Y.
Pak-Well Paper Products Co., P. O. Box 2151, Portland 1, Ore.
Pallet Sales Corp., 122 E. 42nd St., New York 17, N. Y.
Palm Brothers Decalcomania Co., The, 3703 Regent Ave., Cincinnati 12, Ohio
Palm, Fechteler & Co., 85-99 Maple St., Weehawken, N. J.
Palmer Associates, 51 E. 42nd St., New York 17, N. Y.
Palmer-Bee Co., 1701 Poland Ave., Detroit 12, Mich.
Palmer Supplies Co., 2281 Scranton Road, Cleveland 13, Ohio

Palographia Co., The, 74 Lafayette St., New York 13, N. Y.
Paltier Corp., The, 1703 Kentucky St., Michigan City, Ind.
Pan-American Supply Co., 11 Broadway, New York 4, N. Y.
Pannier Corp., The, 207 Sandusky St., Pittsburgh 12, Pa.
Paper Affiliates, Dept. Nalco, Inc., 203 E. 18th St., New York 3, N. Y.
Paper Bag Manufacturers Institute, Inc., 369 Lexington Ave., New York 17, N. Y.
Paper Center, Inc., The, 311 E. 47th St., New York 17, N. Y.
Paper Chemicals, Inc., 168-70——93rd Ave., Jamaica 3, N. Y.
Paper City Mfg. Co., Inc., 624 Hampden St., Holyoke, Mass.
Paper Container Mfg. Co., 28 E. Jackson Blvd., Chicago 4, Ill.
Paper Converting & Finishing Co., 118 No. Ada St., Chicago 7, Ill.
Paper Converting Machine Co., 601 Harvey St., Green Bay, Wis.
Paper Cup & Container Institute, Inc., 250 Park Ave., New York, N. Y.
Paper Kraft, 136 S. Ford Blvd., Los Angeles 22, Calif.
•Paper Machinery & Research, Inc., 1014 Oak St., Roselle, N. J.
Paper Manufacturers Co., 9800 Bustleton Ave., Philadelphia 15, Pa.
Paper Package Co., 1036 N. Capitol Ave., Indianapolis 6, Ind.
Paper Pail Assn., 111 W. Washington St., Chicago 2, Ill.
Paper Quality Control, Inc., 1130 Hardscrabble Road, Chappaqua, N. Y.
Paper Shipping Sack Manufacturers Assn., Inc., 370 Lexington Ave., New York 17, N. Y.
Paperboard Laminating Corp., 237 Main St., Norwalk, Conn.
Paperbox Corp., 63rd & Lowell Sts., Oakland 8, Calif.
Papercraft Corp., The, 5850 Centre Ave., Pittsburgh 6, Pa.
Paperkraft Boxes, Inc., 2210 Temple St., Los Angeles 26, Calif.
Papyrus Co., The, 50 Market St., Kenilworth, N. J.
Par Industries, Inc., 2193 E. 14th St., Los Angeles 2, Calif.
Paraffined Carton Research Council, 111 W. Washington St., Chicago 2, Ill.
Paragon Box Co., 745 Trabert Ave., N.W., Atlanta, Ga.
Paragon Box Corp., 247 Willoughby St., Brooklyn 1, N. Y.
Paragon Molded Plastics, 1422 Seneca St., Seattle 1, Wash.
Paramount Manufacturing Co., 1615 E. Main St., Stockton 1, Calif.
Paramount Paper Products Co., 4401 N. 23rd St., Omaha 11, Neb.
Paramount Paper Products Co., Inc., 501 N. 19th St., Philadelphia 30, Pa.
Parcher, James H., 219 N. Broad St., Philadelphia 7, Pa.
Parfait Promotional Packaging Co., 16 W. 22nd St., New York 10, N. Y.
Parfait Sales, 1500 N. Ogden Ave., Chicago 10, Ill.
Park, Helen, 1058 Second Ave., New York, N. Y.
Park Plastics Co., 940 Park Ave., Linden, N. J.
Parke, Davis & Co., Joseph Campau Ave. at the River, Detroit, Mich.
Par-Pak Co., Inc., The, 1426 W. 117th St., Lakewood 7, Ohio
Parsons, W. A., Co., Inc., Main St., Durham 1, Conn.
Parzinger, Tommi, 441 Madison Ave., New York, N. Y.
Par-Way Custom Packaging, 5136 E. Firestone Place, South Gate, Calif.
Paslode Co., 1325 W. Webster Ave., Chicago 14, Ill.
Patented Paper Packages, 505 Elm Miami Bldg., Cincinnati 2, Ohio
Paterson Engineering Co., 1200 Commercial Trust Bldg., Philadelphia 2, Pa.
Paterson Parchment Paper Co., Bristol, Pa.
Paton Calvert & Co., Ltd., Binns Rd., Liverpool 13, England
Paxton, Krueger & Assoc., Inc., 6 E. 46th St., New York 17, N. Y.
Peerless Confectionery Equipment Co., 158 Greene St., New York 12, N. Y.
Peerless Molded Plastics, Inc., Hamilton & Division Sts., Toledo 2, Ohio
Peerless Packages, Inc., 2545 E. 79th St., Cleveland 4, Ohio
Peerless Packers, Inc., 533 Greenwich St., New York 5, N. Y.
Peerless Paper Box Co., Inc., 149 Wooster St., New York 12, N. Y.
•Peerless Roll Leaf Co., Inc., 4511 New York Ave., Union City, N. J.
•Peerless Tube Co., 58 Locust Ave., Bloomfield, N. J.
Pell Paper Box Co., Elizabeth City, N. C.
Pemco Products Co., 152 W. 65th St., New York 23, N. Y.
Pen-Mac-Nye Co., The, 1056 Home Ave., Akron 10, Ohio
Penn Bottle & Supply Co., 5619 Cherry St., Philadelphia 39, Pa.
Penn-Central Oil Co., 20th & Kansas Ave., Kansas City 5, Kansas
Penn Lithographing Co., 3115 Ridge Ave., Philadelphia 21, Pa.
Penn Tape Savers, D St. at Luzerne, Philadelphia 24, Pa.
Pennsylvania Box & Lumber Co., 2331 N. Bodine St., Philadelphia 33, Pa.
•Pennsylvania Glass Products Co., Inc., 430 N. Craig St., Pittsburgh 13, Pa.
Peoria Plastic Co., 215 Taylor St., East Peoria, Ill.
Perfect Finishing Co., Inc., 200 Varick St., New York 14, N. Y.
Perfection Packaging Co., 13-19 Mill St., Shelburn, Ind.
Perkins, B. F., & Sons, Inc., Chicopee St., Holyoke, Mass.
Pell Paper Box Co., Elizabeth City, N. C. lyn 1, N. Y.
Permacel Tape Corp., U. S. Highway #1, New Brunswick, N. J.
•Permanent Label Corp., 49 Ackerman St., Bloomfield, N. J.
Perm-O-Last Finishing Co., The, 205 Cherry St., Waterbury, Conn.
Perry Envelope & Bag Co., Inc., 3639 Dyre Ave., New York 66, N. Y.
Perry Metal Products Co., Inc., 1127 Atlantic Ave., Brooklyn 16, N. Y.
Perry Plastics, Inc., 561 E. 18th St., Erie, Pa.
•Peter Partition Corp., 19-21 Heyward St., Brooklyn 11, N. Y.
Peters Chemical Mfg. Co., 3623 Lake St., Melrose Park, Ill.
•Peters Machinery Co., 4700 Ravenswood Ave., Chicago 40, Ill.
Peters, Ralph E., Co., 420 Market St., San Francisco 11, Calif.
Petroleum Solvents Corp., 164 Blanchard St., Newark, N. J.
Petroleum Specialties, Inc., 205 E. 42nd St., New York 17, N. Y.
Petrolite Corp., Wax Division, 30 Broad St., New York 4, N. Y.
Pexco Bag Mfg. Co., 32 S. Huron St., Toledo 4, Ohio
Pfaudler Co., The, 1000 West Ave., Rochester 3, N. Y.
Pfingston Engineering Co., 2212 W. 71st St., Chicago, Ill.
•Pfizer, Charles, & Co., Inc., 630 Flushing Ave., Brooklyn 6, N. Y.
Pharmaceutical & Chemical Industries Supply Corp., 16 Hudson St., New York 13, N. Y.
Pharmacy Paper Box Co., 3401 W. Division St., Chicago 51, Ill.
PharmaPlastics, Inc., 205 So. Smallwood St., Baltimore 23, Md.
Phelps Manufacturing Co., 916 N. 15th St., Terre Haute, Ind.
Philadelphia Paper Co., 3000 Reed St., Philadelphia 46, Pa.
Philadelphia Quartz Co., 1146 Public Ledger Bldg., Philadelphia 6, Pa.
Philipp Lithographing Co., 1422 N. Fourth St., Milwaukee 16, Wis.
Phillips Assoc., 421——40th St., Oakland 9, Calif.
Phillips Chemical Co., Sub. Phillips Petroleum Co., Bartlesville, Okla.
Phillips Paper Products, Inc., 125 Second St., Brooklyn 31, N. Y.
Phillips, Thos., Co., The, 23 W. Exchange St., Akron 8, Ohio
Phin Sales Co., 26 Lipton Ave., Toronto 6, Ont., Canada
Phoenix Industries, Inc., 400 W. North St., Indianapolis 6, Ind.
Phoenix Metal Cap Co., 2444 W. 16th St., Chicago 8, Ill.
Phoenix Products Co., 4715 N. 27th St., Milwaukee 16, Wis.
Phoenix Steel Container Div., Phoenix Tinware Co., Inc., 200 Kosciusko St., Brooklyn 16, N. Y.
Photovolt Corp., 95 Madison Ave., New York 16, N. Y.
Picken, Mary Brooks, 11 E. 73rd St., New York, N. Y.
Pickwick Papers, Inc., 33 Bethune St., New York 14, N. Y.
Pictorial Paper Package Corp., 232 S. Lake St., Aurora, Ill.
Piedmont Label Co., Inc., 311 W. Depot St., Bedford, Va.
Pie-Pak Co., Inc., 1300 Hudson St., Hoboken, N. J.
Pierce Wrapping Machine Co., 1100 E. 31st St., La Grange Park, Ill.
Pierson Associates, 131 State St., Boston 9, Mass.
Pilliod Cabinet Co., The, Swanton, Ohio
Pineville Wood Products, Inc., P. O. Box 232, Pineville, La.
Pioneer Can Co., Inc., Highland Ave., Clifton, N. J.
Pioneer Cooperage Co. of Illinois, 450 N. Hoyne Ave., Chicago 12, Ill.
Pioneer Engraving Co., P. O. Box 266, Charlton City, Mass.
Pioneer Folding Box Co., 165 Front St., Chicopee, Mass.
Pioneer Paper Box Co., 115-125 Nineteenth Ave., S., Minneapolis 4, Minn.
Pioneer Valley Plastics Co., 7 Springfield St., Chicopee, Mass.
Pioneer Wire Stitcher Co., Amber & Hagert St., Philadelphia 25, Pa.
Piqua Paper Box Co., The, 616 Covington Ave., Piqua, Ohio
Pitkin, Lucius, Inc., 47 Fulton St., New York 38, N. Y.
Pitney-Bowes, Inc., 79 Walnut St., Stamford, Conn.
Pittsburgh Plate Glass Co., Fiber Glass Div., 1 Gateway Center, Pittsburgh 22, Pa.
Plageman Enterprises, 122 Sylvia St., Willoughby, Ohio
Planned Sales Limited, 1067 Yonge St., Toronto, Ont., Canada
Plastal Specialties Co., 116 W. Denny Way, Seattle 99, Wash.
Plas-Tex Corp., The, 2525 Military Ave., Los Angeles 25, Calif.
•Plastic Artisans, Inc., 70 Westchester Ave., White Plains, N. Y.
Plastic Assembled Products Co., 1149 Watson St., Baltimore 31, Md.
Plastic Box Co., 2500——18th St., San Francisco 10, Calif.
Plastic Coating Corp., The, 38 Winter St., Holyoke 1, Mass.
Plastic Container Corp., West Warren, Mass.

Plastic Film Corp., Community Ave., Plainfield, Conn.
Plastic Inlays, Inc., 282 Broad St., Summit, N. J.
Plastic Manufacturers, Inc., 280 Fairfield Ave., Stamford, Conn.
Plastic Molded Products Co., 6044 N. Pulaski Road, Chicago 30, Ill.
Plastic Packaging Co., 2035 W. Charleston St., Chicago 47, Ill.
Plastic Packaging Corp., 345 Central St., Leominster, Mass.
Plastic Products, Inc., 415 Lexington Ave., New York 17, N. Y.
Plastic Products Manufacturers Assn., Inc., 1133 Broadway, New York 10, N. Y.
Plasticite Corp., 327 Rider Ave., New York 51, N. Y.
Plastics Engineering Co., 1607 Geele Ave., Sheboygan, Wis.
Plastics, Inc., 224 Ryan Ave., St. Paul 2, Minn.
Plastics Marking Co., 441—51st St., West New York, N. J.
Plastics Research Foundation, 370 Commonwealth Ave., Boston 15, Mass.
•Plas-Ties Co., P. O. Box 27, Santa Ana, Calif.
Plasti-Kote, Inc., 425 Lakeside Ave., N.W., Cleveland 13, Ohio
Plasti-Pak Containers, Ltd., Plastics Ave., Toronto, Ont., Canada
Plastofilm, Inc., 916 W. Union Ave., Wheaton, Ill.
Plastomatic Corp., King & Bridge Sts., Malvern, Pa.
Plas-Tube Corp., 26 Fahey St., Springdale, Conn.
Platt Corp., 1415 Key Highway, Baltimore 30, Md.
•Plax Corp., 672 Farmington Ave., West Hartford, Conn.
Plaxall, Inc., 5-26—46th Ave., Long Island City 1, N. Y.
Pletcher & Pollack, 1270 Broadway, New York 1, N. Y.
Plicose Manufacturing Corp., 71 Box St., Brooklyn 22, N. Y.
Plyfiber Container Corp., 650 South Ave., Garwood, N. J.
•Pneumatic Scale Corp., Ltd., 65 Newport Ave., Quincy 71, Mass.
Pohlig Bros., 2419 E. Franklin St., Richmond 23, Va.
Point-of-Purchase Advertising Institute, Inc., 11 W. 42nd St., New York, N. Y.
Poland Brothers, Inc., 305 S. Sharp St., Baltimore 1, Md.
Poliner, William, 780 Grand Concourse, Bronx 51, N. Y.
Pollock Paper Corp., Div. St. Regis Paper Co., 2236 S. Lamar St., Dallas 22, Texas
Polo Plastics Co., 1718 N. 1st St., Milwaukee 12, Wis.
Poly Perm Printing, Inc., 64 W. 23rd St., New York 10, N. Y.
Poly Plastic Products, Inc., 2 Fourth Ave., Paterson 4, N. J.
Polygon Products Co., 1432-1434 W. Lake St., Chicago 7, Ill.
Polyken Products, Dept. of the Kendall Co., 222 W. Adams St., Chicago 6, Ill.
Polymer Industries, Inc., Springdale, Conn.
•Poly-Seal Corp., The, 405 Lexington Ave., New York 17, N. Y.
Ponten, J. S., Co., 600 Sixteenth St., Oakland 12, Calif.
Pope & Gray, Inc., 17 Industrial West St., Allwood, Clifton, N. J.
•Popper & Sons, Inc., 300 Fourth Ave., New York 10, N. Y.
Poris, Harry, Co., 687 Lexington Ave., New York 22, N. Y.
Port Allegany Corp., Railroad Ave., Port Allegany, Pa.
Port Huron Sulphite & Paper Co., Port Huron, Mich.
Port Studios, 325 W. Huron St., Chicago 10, Ill.
Portland Label Co., 8213 S.E. 17th Ave., Portland 2, Ore.
Portland Paper Box Co., 226 S.E. Madison St., Portland 14, Ore.
Posner, S., Sons, Inc., Metropolitan & Scott Aves., Brooklyn 37, N. Y.
Post, Herbert A., Inc., 31-11—20th Rd., Long Island City, N. Y.
•Post Machinery Co., 140 Elliott St., Beverly, Mass.
•Potdevin Machine Co., 200 North St., Teterboro, N. J.
Potlatch Forests, Inc., 1450 W. Holt Ave., Pomona, Calif.
Potter Instrument Co., Inc., 115 Cutter Mill Road, Great Neck, N. Y.
Pottsville Box Corp., Railroad & Water Sts., Pottsville, Pa.
Powell, Gerry, Associates, 522 Fifth Ave., New York 36, N. Y.
Power-Curve Conveyor Co., 2185 S. Jason St., Denver, Colo.
Powers, Joseph, 146 E. 34th St., New York 16, N. Y.
Powr-Pak, Inc., 643 North Ave., Bridgeport 6, Conn.
Prairie States Oil & Grease Co., P. O. Box 856, Danville, Ill.
Precise Engineering Co., The, 3026 W. Montrose Ave., Chicago, Ill.
Precision Extruders, Inc., 289 N. Main St., Leominster, Mass.
Precision Plastic Products, Inc., 628 W. Lake St., Chicago 6, Ill.
Precision Plastics Co., 4655 Stenton Ave., Philadelphia 44, Pa.
Precision Staple Corp., 3944 Fifth Ave., Sarasota, Fla.
•Precision Valve Corp., 700 Nepperhan Ave., Yonkers 3, N. Y.
Premier Bag Co., Inc., Newark & Page Aves., Lyndhurst, N. J.
Premier Paper Box Co., 677 N. Point St., San Francisco 11, Calif.
Premier Plastics Co., 905 Atlantic Ave., Brooklyn 38, N. Y.
Prentice Products Co., Lincolnway E., Fort Wayne, Ind.
Prentiss, George W., & Co., 439 Dwight St., Holyoke, Mass.
Prepac, Inc., 151 W. 26th St., New York 1, N. Y.
Presin Co., 5225 Wilshire Blvd., Los Angeles 36, Calif.
Press of H. N. Cornay, 500 Hagan St., New Orleans 19, La.
Presstite Engineering Co., 3738 Chouteau Ave., St. Louis 10, Mo.
Pressure Pack, Inc., 18550 Mack Ave., Detroit 36, Mich.
Prestige Press, Inc., 22 W. 19th St., New York 11, N. Y.
Presto Plastic Products Co., Inc., 11 E. 26th St., New York 10, N. Y.
Price Bros. Lithograph Co., P. O. Box 444, Bridgeton, N. J.
Prince Basket Co., Pittsburg, Texas
Print-A-Tube Co., 114 Essex St., Rochelle Park, N. J.
Printed Cellophane Tape Co., 521 N. La Brea Ave., Los Angeles 36, Calif.
Printed Products, Inc., 455 Wagner Pl., Memphis, Tenn.
Printers Finishing Co., 611 William St., Baltimore 30, Md.
Printing Industries Equipment, Inc., 135 W. 20th St., New York 11, N. Y.
Printing Machinery Co., The, 436 Commercial Sq., Cincinnati 2, Ohio
Printloid, Inc., 93 Mercer St., New York 12, N. Y.
Printographic Offset Corp., 52 E. 19th St., New York, N. Y.
Printon Corp., 304 E. 23rd St., New York 10, N. Y.
Private Brands, Inc., 1 Pleasant Ave., Clifton, N. J.
Process Displays, Inc., 717 S. Sixth St., Milwaukee 4, Wis.
Producers Exchange, Inc., 32 So. Huron St., Toledo 4, Ohio
•Product Packaging Engineering, 5747 Marilyn Ave., Culver City, Calif.
Production Instrument Co., 710 W. Jackson Blvd., Chicago 6, Ill.
Production Metal Products Co., Inc., 1550 W. Cortland St., Chicago 22, Ill.
Products Filling & Packaging Co., 225 W. Illinois St., Chicago 10, Ill.
•Products Packaging, Inc., 6400 Herman Ave., Cleveland 2, Ohio
Progress Lithographing Co., The, Section Rd. & Penna. R. R., Cincinnati 37, Ohio
Progressive Electronics Co., Inc., 120 Home Pl., Lodi, N. J.
•Progressive Machine Co., 293 Hudson St., Hackensack, N. J.
Prolon Plastics Div., Prophylactic Brush Co., Pine St., Florence, Mass.
Propack, Inc., 349 Lincoln St., Hingham, Mass.
Proprietary Assn., 810—18th St., N.W., Washington, D. C.
Protective Coatings Corp., Atlas Package & Container Corp. Div., 596 River Road, Clifton, N. J.
Protective Lining Corp., 22 Woodhull St., Brooklyn 31, N. Y.
Protective Packaging Corp., 175 Waverly Ave., Newark 8, N. J.
Protective Papers, Inc., Union, Ill.
Protect-O-Pak Sales & Engineering Co., 19501 Harper Ave., Detroit 36, Mich.
Protexall Permanent Process Service, 416 E. Ninth St., Kansas City 6, Mo.
Puget Sound Paper Box Co., 707 Snoqualmie St., Seattle 8, Wash.
Puget Sound Pulp & Timber Co., Paperboard Div., 300 Laurel St., Bellingham, Wash.
Pull-Packaging, Inc., 1724 W. Indiana Ave., Philadelphia 32, Pa.
Pulp Reproduction Co., 3000 W. Clarke St., Milwaukee 45, Wis.
Purdy Machinery Co. Ltd., 41-42 Prescot St., London, E.1, England
Purinton Pottery Co., Box 183, Shippenville, Pa.
Puritan Distributing Co., Aerosol Filling Div., 160 Washington St., N., Boston 14, Mass.
Puritan Packaging Corp., 2319 S. Sixth St., Columbus 7, Ohio
Puritan Products Corp., 2319 S. Sixth St., Columbus, Ohio
Purton, Inc., 218 Lucas St., Sycamore, Ill.
Pyro Plastics Corp., 690 Chesnut St., Union, N. J.
Pyrotex Leather Co., 287 Whitney St., Leominster, Mass.
•Pyroxylin Products, Inc., 4851 S. St. Louis Ave., Chicago 32, Ill.

Q

Quadri-Color Co., First Ave. & 57th St., Brooklyn 20, N. Y.
Quaker City Paper Box Co., Inc., 12th & Brown Sts., Philadelphia 23, Pa.
Quaker Packaging Equipment Co., 1931 Arch St., Philadelphia 3, Pa.
Quality Park Box Co., 450 N. Syndicate St., St. Paul 4, Minn.
Quantacolor Co., Inc., The, 10 Rockefeller Plaza, New York 20, N. Y.
•Quatrum Corp., 437 E. 107th St., Chicago 28, Ill.
Queen City Paper Co., The, 520 Broadway, Cincinnati 2, Ohio
Queen City Tulatax Corp., Pine St., Burlington, Vt.
•Queen Transparent Specialties, 4637 W. Fullerton Ave., Chicago 39, Ill.

Queens Lithographing Corp., 52-25 Barnett Ave., Long Island City 4, N. Y.
Quimby-Walstrom Paper Co., 25-29 Ionia Ave., S.W., Grand Rapids 2, Mich.
Quincy Paper Box Co., Vermont & Third St., Quincy, Ill.
Quinn, Don L., Co., The, 224 W. Kinzie St., Chicago 10, Ill.
Quon-Quon Co., 1823 S. Hope St., Los Angeles, Calif.

R

•R. C. Can Co., 9430 Page Blvd., St. Louis 14, Mo.
RCS Tool Sales Corp., P. O. Box 1434, Joliet, Ill.
R E B Trays, Inc., 1134 Land Title Building, Philadelphia 10, Pa.
Rabinowitz, J., & Sons, Inc., 2 Hanson Place, Brooklyn 17, N. Y.
Racquette River Paper Co., Potsdam, N. Y.
Radiant Color Co., 830 Isabella St., Oakland 7, Calif.
Radiation Applications, Inc., 342 Madison Ave., New York 17, N. Y.
Radio Corp. of America, Front & Cooper Sts., Camden 2, N. J.
Radio Frequency Laboratories, Inc., Powerville Rd., Boonton, N. J.
Radio Receptor Co., Inc., Thermatron Div., 251 W. 19th St., New York 11, N. Y.
Raffi & Swanson, Inc., 100 Eames St., Wilmington, Mass.
Raible, J. R., Co., The, 205 So. 32nd St., Birmingham 9, Ala.
Rainbow Ribbons & Fabrics, Inc., 404 E. 108 St., New York 29, N. Y.
Raisin, John T., Corp., 70 Berry St., San Francisco 7, Calif.
Ralston, W., & Co., Inc., W. 177th St. & Harlem River, Morris Heights, Bronx 53, N. Y.
Ranburn Co., Inc., The, 112 Killewald Ave., Tonawanda, N. Y.
Rand Avery-Gordon Taylor, Inc., 871 Commonwealth Ave., Boston 15, Mass.
Randall Duster Corp., 43 Theo. Fremd Ave., Rye, N. Y.
Randolph Box & Label Co., 843 W. Van Buren St., Chicago 7, Ill.
Randolph Cooperage Co., 341 W. 43rd St., Chicago, Ill.
Randolph Paper Box Corp., 15th & Dinwiddie Ave., Richmond 5, Va.
Randolph Products Co., Twelfth St., Carlstadt, N. J.
Rapid Cutting Co., Inc., 90 Engert Ave., Brooklyn 22, N. Y.
Rapid Grip & Batten Limited, 384 Vitre St., W., Montreal, Canada
Rapid Mounting & Finishing Co., 310 W. Polk St., Chicago 7, Ill.
Rapids-Standard Co., Inc., The, 144 Trowbridge St., N.W., Grand Rapids 2, Mich.
Rapinwax Paper Co., 150—26th Ave., S.E., Minneapolis 14, Minn.
Rappaport, S., Inc., 155 Ave. D, New York 9, N. Y.
Raritan Engraving Co., 107 E. 17th St., Paterson 4, N. J.
Rathbone, Hair & Ridgway Box Co., 1440 W. 21st Place, Chicago 8, Ill.
Rathbun & Bird Co., Inc., The, 379 West Broadway, New York 12, N. Y.
Rathbun Molding Corp., 290 Rochester St., Salamanca, N. Y.
•Rau Rubber Engraving Co., 260 Hudson St., Hackensack, N. J.
Rawsons (Labeling Machines) Ltd., 7 Calverley Park Gardens, Tunbridge Wells, Kent, England
Raymond Bag Co., The, Enoch & Wildwood Sts., Middletown, Ohio
Rayon Processing Co. of R. I., Inc., 1 Moshassuck St., Pawtucket, R. I.
Read, H. A. S., Inc., 119 Braintree St., Boston 34, Mass.
Reading Corrugated Container Corp., Grace & Meade Sts., Reading, Pa.
Reading Glazed Paper Corp., 319 N. River Road, Reading, Pa.
Reading Paper Box Co., Reading, Pa.
Reads Ltd., Orrell House, Orrell Lane, Walton, Liverpool 9, England
Re-Bo Mfg. Co., Inc., 331 Madison Ave., New York 17, N. Y.
•Redington, F. B., Co., 3016 St. Charles Road, Bellwood, Ill.
Reed-Prentice Corp., 677 Cambridge St., Worcester 4, Mass.
Reeves Brothers, Inc., 54 Worth St., New York 13, N. Y.
Reeves Pulley Co., 1225 Seventh St., Columbus, Ind.
Regal Chemical Corp., 115 Dobbin St., Brooklyn 22, N. Y.
Regent Paper Box Co., Frankford & Torresdale Aves., Philadelphia 24, Pa.
Regal Plastic Co., 2800 E. 14th St., Kansas City 27, Mo.
Regent Tube & Bag Co., 39 E. 20th St., New York 3, N. Y.
Reilly Tar & Chemical Corp., 1615 Merchant Bank Bldg., Indianapolis 4, Ind.
Reinecke & Associates, 155 E. Ohio St., Chicago 11, Ill.
Reiner, George, Studio, 212 Fifth Ave., New York 10, N. Y.
Reinhold-Gould, Inc., 535 Fifth Ave., New York 17, N. Y.
Reliable Screen Process Co., 34-36 Isabelle St., Pittsburgh 12, Pa.
Reliance Paper Box Co., 1720 N. Fifth St., Philadelphia 22, Pa.
Renois Tying Machines, Inc., 1956 Hawthorne Ave., Melrose Park, Ill.
Republic Container Corp., 1561 Hudson Blvd., Jersey City 5, N. J.
Republic Foil & Metal Mills, Inc., 55 Triangle St., Danbury, Conn.
Republic Ribbon & Bow Co., Inc., 141 W. 28th St., New York 1, N. Y.
Republic Steel Corp., Container Div., 465 Walnut St., Niles, Ohio
•Resina Automatic Machinery Co., Inc., 572 Smith St., Brooklyn 31, N. Y.
•Reslac Chemicals, Inc., 3634 W. 38th St., Chicago 32, Ill.
Ressinger, Paul, 1695 Meadow Lane, Highland Park, Ill.
Retail Packaging Corp., 305 S. Sharp St., Baltimore 1, Md.
Revolvator Co., Tonnelle Ave., No. Bergen, N. J.
•Rex Packaging Machine Co., 41-43 Washington Ave., Elizabeth 1, N. J.
Rex Specialty Bag Corp., 101 Onderdonk Ave., Brooklyn 37, N. Y.
Rexford Paper Co., 3100 W. Mill Road, Milwaukee 9, Wis.
Reyburn Mfg. Co., Inc., 16th St. & Indiana Ave., Philadelphia 32, Pa.
Reynolds Chemical Products Co., Div. Reynolds Spring Co., 234 W. Cortland St., Jackson, Mich.
Reynolds Ink, Inc., 4500 Euclid Ave., Cleveland 3, Ohio
•Reynolds Metals Co., 2500 S. Third St., Louisville 1, Ky.
Rheem Mfg. Co., 801 Chesley Ave., Richmond 4, Calif.
•Rhinelander Paper Co., 515 W. Davenport St., Rhinelander, Wis.
Rhoades Paper Box Co., Inc., 66 St. John Place, Springfield, Ohio
Richard, Charles F., 37 Clyde Ave., Buffalo 15, N. Y.
Richards, Harper, 160 E. Superior St., Chicago, Ill.
•Richards, J. A., Co., 903 N. Pitcher St., Kalamazoo, Mich.
Richardson Co., Melrose Park, Ill.
Richardson Scale Co., 668 Van Houten Ave., Clifton, N. J.
•Richardson Taylor-Globe Corp., The, 4501 W. Mitchell Ave., Cincinnati 32, Ohio
Richford Corp., 404 Fourth Ave., New York 16, N. Y.
Richman, Mel, Studios, Inc., 2009 Chesnut St., Philadelphia 3, Pa.
•Richter, Frederic A., 1220 N. State Parkway, Chicago 10, Ill.
•Riegel Paper Corp., 260 Madison Ave., New York 16, N. Y.
Rieke Metal Products Corp., Auburn, Ind.
Ring Supply Co., Oliver Block, Pittsburgh, Pa.
Ringwood Chemical Corp., Ringwood, Ill.
Ripley Co., Inc., 1 Factory St., Middletown, Conn.
•Risdon Manufacturing Co., Box 520, Naugatuck, Conn.
Ritchie, W. C., & Co., 8801 S. Baltimore Ave., Chicago 17, Ill.
River Raisin Paper Co., 1109 E. Elm St., Monroe, Mich.
Robert Corp., 240 Canal St., Lawrence, Mass.
Roberts Development Corp., Hanover, Mass.
Roberts, Lewis, Inc., 72 Union St., Newark 5, N. J.
Roberts Patent Filling Machine Co., Ltd., Deane Road, Bolton, Lancashire, England
Robertshaw-Fulton Controls Co., Youngwood, Pa.
Robertson Paper Box Co., Inc., Montville, Conn.
Robinson, A. E., Co., The, 40 S. Clinton St., Chicago 6, Ill.
Robinson Clay Product Co., The, 65 W. State St., Akron 9, Ohio
Robinson, E. S. & A., (Canada) Ltd., 69 Laird Drive, Leaside, Toronto, Ont., Canada
Robinson Industries, Inc., Franklin Plastics Div., 315 Grant St., Franklin, Pa.
Robinson Tag & Label Co., 460 W. 34th St., New York 33, N. Y.
Robinson Waxed Paper Co. Ltd., The, Filwood Road, Fishponds, Bristol, England
Robles Transparent Products Corp., 316 Hudson St., New York 13, N. Y.
Rochester Folding Box Co., Boxart St., Rochester 3, N. Y.
Rock Manufacturing Co., 1776 Central St., Stoughton, Mass.
Rocky Mountain Steel Products, Inc., 1360 Wall St., Los Angeles 15, Calif.
Roda, Fratelli, S. A., Viganello, Lugano, Switzerland
Roddis Plywood Corp., Marshfield, Wis.
Rodgers, George G., Co., Inc., 2401 Third Ave., New York 51, N. Y.
Roesch, Louis, Co., 1886 Mission St., San Francisco 3, Calif.
Rogers Plastic Corp., West Warren, Mass.
Rogers Printing & Carton Co., 1540 Russell St., Baltimore 30, Md.
Rogers, V. F., 2454—15th St., Denver 2, Colo.
Rohde, Peggy Ann, 22 E. 60th St., New York 22, N. Y.
Rohm & Haas Co., Washington Square, Philadelphia 5, Pa.
Roller Engraving Co., 36-12—48th Ave., Long Island City, N. Y.
Roll-On-Sealer Co., Antioch, Ill.
Rollprint Products Corp., 2301 Wabansia Ave., Chicago 47, Ill.
Rome Plastic Specialties, Inc., 11 Harrison St., Worcester 4, Mass.
•Rondo American Corp., 100 Sanford St., Hamden 14, Conn.
Rondout Paper Mills, Inc., Napanoch, N. Y.
Ronor Corp., 1360 W. Ninth St., Cleveland 13, Ohio

Rose Brothers (Gainsborough) Ltd., Ropery Road, Gainsborough, Lancs., England
Rose, Gene, Co., Inc., 1637 S. Kilbourn Ave., Chicago 23, Ill.
Rosebud Mfg. Corp., 874 Broadway, New York 3, N. Y.
Rosen, Cele, Studio, 737 N. Michigan Ave., Chicago 11, Ill.
Rosenthal Bros. Cords & Tassels, Inc., 47-05 Fifth St., Long Island City 1, N. Y.
•Rosenthal Mfg. Co., 5029 N. Kedzie Ave., Chicago 25, Ill.
Rosenthal Paper Co., 200 Lynch St., St. Louis 18, Mo.
Ross Container & Seal Co., 280 Broadway, New York 7, N. Y.
Ross, Gene, 148 E. 48th St., New York 17, N. Y.
Ross & Roberts Co., 1299 W. Broad St., Stratford, Conn.
Rossotti Lithograph Corp., 8511 Tonnelle Ave., No. Bergen, N. J.
Roto Bag Machine Corp., 130 E. 13th St., New York 3, N. Y.
Rotogravure Engineering Corp., 2823 S. Floyd St., Louisville 1, Ky.
Rotogravure Packaging, Inc., Church & Morland Sts., Addison, Ill.
Roto-Lith Ltd., 30 W. 13th St., New York 11, N. Y.
Rotoprint & Specialty Co., 2306 N. Knox Ave., Chicago 39, Ill.
Roto-Type Corp., 38-32——54th St., Woodside, N. Y.
Roto Wrap Machine Corp., 241 William St., Englewood, N. J.
Roura Iron Works, Inc., 1401 Woodland St., Detroit 11, Mich.
•Rowell, E. N., Co., Inc., Batavia, N. Y.
Rowland, E. W., Associates, 110 Washington St., New York 6, N. Y.
•Royal Mfg. Co., Inc., 200 N. Granite St., Prescott, Ariz.
Royal Paper Corp., 210——11th Ave., New York 1, N. Y.
Royal-Pioneer Paper Box Mfg. Co., Inc., 1147 N. Fourth St., Philadelphia 23, Pa.
Royce, Stark & Co., 3727 N. Palmer St., Milwaukee 12, Wis.
Rubba, Inc., 1015 E. 173rd St., New York 60, N. Y.
•Rubber & Asbestos Corp., 233 Belleville Ave., Bloomfield, N. J.
Rubber Latex Co. of America, 110 Delewanna Ave., Clifton, N. J.
Ruberoid Co., The, 500 Fifth Ave., New York 36, N. Y.
Rubin, Jack, Box Co., 1910 Elston Ave., Chicago 22, Ill.
Rubner, Gustave, Corp., 5925 Broadway, New York, N. Y.
Rucker Co., The, 4228 Hollis St., Oakland 8, Calif.
Rudnick, Alexander, & Son, 476 Broome St., New York, N. Y.
Rupaco Paper Corp., 62 Fourth St., Brooklyn 31, N. Y.
Rutherford Machinery Co., Div. Sun Chemical Corp., 10th St. & 44th Ave., Long Island City 1, N. Y.
Rway Synthetic Products Div., Reiss Mfg. Corp., 107 Fourth Ave., New York 3, N. Y.

S

S & S Corrugated Paper Machinery Co., Inc., 160 N. Fourth St., Brooklyn 11, N. Y.
Sackett, DeForest, 410 S. Michigan Ave., Chicago, Ill.
Sacramento Box & Lumber Co., 65th & R Sts., Sacramento 6, Calif.
Safeway Products Div., Yorkville Paper Co., Inc., 431 E. 77th St., New York 21, N. Y.
Sage Equipment Co., 30 Essex St., Buffalo 13, N. Y.
Sager Bros., 133 W. 24th St., New York 11, N. Y.
Saidel, W. R., & Co., 294 Dogwood St., Park Forest, Ill.
St. Clair Specialty Mfg. Co., 207 E. Grand Ave., Chicago 11, Ill.
St. Joe Paper Co., Houston Container Div., 1300 W. Post Rd., Houston 24, Texas
St. Johns Box Co., Palatka, Fla.
St. Louis Lithographing Co., 6801 South Broadway, St. Louis 11, Mo.
St. Regis Paper Co., 230 Park Ave., New York 17, N. Y.
St. Regis Paper Co., Panelyte Div., 230 Park Ave., New York 17, N. Y.
Sakier, George, 340 E. 71st St., New York 22, N. Y.
Sale Lithograph Co., 220 Washington St., Buffalo 3, N. Y.
Salem Label Co., 838 S. Lundy Ave., Salem, Ohio
Salmini, J. P., Co., Inc., 41 California St., Bridgeport 8, Conn.
Salwen, Joe, Paper Products Corp., 245 W. 67th St., New York 23, N. Y.
Sample-Durick Co., Inc., P. O. Box 207, Chicopee, Mass.
Sampson, Cornelius, & Associates, 722 Montgomery St., San Francisco 11, Calif.
Samuel, Berte, 14 Jones St., New York, N. Y.
Samson Plastic Products Co., P. O. Box 3277, Olympic Station, Beverly Hills, Calif.
Samuels Products, Inc., Broadway & Commercial Square, Cincinnati 2, Ohio
San Diego Paper Box Co., 1924 Adams Ave., San Diego, Calif.
Sandee Mfg. Co., 5050 W. Foster Ave., Chicago 30, Ill.
Sandusky Cooperage & Lumber Co., Div., Greif Brothers Cooperage Corp., 3957 Park Ave., St. Louis 10, Mo.
Sandvik Steel, Inc., Steel Belt Conveyor Div., 111 Eighth Ave., New York 11, N. Y.
Sandy Hill Iron & Brass Works, The, 27 Allen St., Hudson Falls, N. Y.
Sanford, H. C., Associates, 343 Lexington Ave., New York, N. Y.
•Sanford, William B., Inc., 601 W. 26th St., New York 1, N. Y.
San Jose Paper Box Co., 1021 Richard Ave., Santa Clara, Calif.
San Mateo Development Co., Inc., 1518 No. Fourth St., San Jose, Calif.
Sapal Societe Anonyme des Plieuses Automatiques Lausanne, Avenue Dapples 54, Lausanne, Switzerland
Saphier, Michael, Associates, 18 E. 48th St., New York 17, N. Y.
Saranac Machine Co., 376 W. Main St., Benton Harbor, Mich.
Sauer Cooperage Co., 341 Goddard Road, Wyandotte, Mich.
Sauter, C. Albert, Co., Inc., Water & Jackson Sts., Philadelphia 48, Pa.
Sav-Way Sara Seal, Inc., 30 Emery St., Detroit 3, Mich.
Scale Specialties & Systems, Inc., Roseland, N. J.
Scandia Mfg. Co., 500 Belleville Turnpike, No. Arlington, N. J.
Scarmar Mfg. Co., 102-106 Straight St., Paterson 1, N. J.
Schaefer Machine Co., Inc., 49 Carbon St., Bridgeport 5, Conn.
Scheele, Edwin H., 53-30 Skillman Ave., Woodside, N. Y.
Schenker Co., The, 2301 Wabansia St., Chicago 47, Ill.
Scherer, John R., Co., Inc., Church & Morland Sts., Addison, Ill.
Schiefer Folding Box Corp., 801 W. Fayette St., Syracuse 4, N. Y.
Schiffenhaus Bros., 2013 McCarter Highway, Newark 4, N. J.
Schladermundt, Peter, 205 E. 42nd St., New York, N. Y.
Schleicher, F. J., Paper Box Co., 1811 Chouteau Ave., St. Louis 3, Mo.
Schmidt, Henry, & Bro., Inc., 875 N. 28th St., Philadelphia 30, Pa.
Schmidt Lithograph Co., 461 Second St., San Francisco 7, Calif.
Schmitt, Charles J., Co., Inc., 25th & Indiana St., San Francisco 7, Calif.
Schmitz, Henry A., Inc., 149 Bath St., Ballston Spa, N. Y.
Schmutz Mfg. Co., Inc., 1600 W. Main St., Louisville 3, Ky.
Schnellpressenfabrik, AG Heidelberg, 17a Heidelberg-Baden, U. S. Zone, Germany
Schnier, I. F., Co., Inc., 683 Bryant St., San Francisco 7, Calif.
Schnur-Appel, 2165 Morris Ave., Union, N. J.
Schoen, Eugene, 45 Gramercy Park N., New York, N. Y.
•Schoettle, Edwin J., Co., Inc., 533 N. 11th St., Philadelphia 23, Pa.
Schooler Mfg. Co., 101 W. Magnolia Blvd., Burbank, Calif.
•Schrader's, A., Son, Div. Scovill Mfg. Co., Inc., 470 Vanderbilt Ave., Brooklyn 38, N. Y.
Schreckengost, Viktor, 2366 Noble St., Cleveland, Ohio
Schroeder, Arthur, Paper Co., Inc., 420 Lexington Ave., New York 17, N. Y.
Schroeder Machines Corp., 3122 Grant Blvd., Syracuse 8, N. Y.
Schrom, Archie M., 461 E. Ohio St., Chicago, Ill.
Schulman, A., Inc., 790 E. Tallmadge Ave., Akron 10, Ohio
Schulman, Frank, Paper Corp., 6 Astor Place, New York 3, N. Y.
Schultz Engineering Corp., 190 Banker St., Brooklyn 22, N. Y.
Schuman, Harold, 230 Boylston St., Boston 16, Mass.
Schusterman, William V., 101 W. 31st St., New York 1, N. Y.
Schutz Bros., 152 Chambers St., New York 7, N. Y.
Schwartz Chemical Co., Inc., 326-328 W. 70th St., New York 23, N. Y.
Schwarz, Norbert F., 49 E. Oak St., Chicago 11, Ill.
Schweitzer, Peter J., Inc., 1029 Newark Ave., Elizabeth, N. J.
Scientific Filter Co., 56A Rose St., New York 38, N. Y.
Scott & McDonald, Inc., 108 E. Dedham St., Boston 18, Mass.
•Scott Plastics, 410 Windsor St., Hartford 5, Conn.
Scovill Manufacturing Co., 99 Mill St., Waterbury 20, Conn.
Screenmasters, 128——32nd St., Brooklyn 32, N. Y.
Sculptural Promotions, Inc., 441 Lexington Ave., New York 17, N. Y.
Seaboard Manufacturing Labs., Inc., Water & Mifflin Sts., Philadelphia 48, Pa.
Seal & Label Institute, 370 Lexington Ave., New York, N. Y.
Sealed Liquids Co., 423-425 Barretto St., New York 59, N. Y.
Sealine Mfg. Corp., 170 N. Peoria St., Chicago 7, Ill.
Seal-Peel, Inc., 11400 E. Nine Mile Road, Van Dyke, Mich.
Sealright Co., Inc., 314 S. First St., Fulton, N. Y.
Seal-Spout Corp., 361-67 Jelliff Ave., Newark 8, N. J.
Seaman Box Co., Inc., 443 Greenwich St., New York 13, N. Y.
Seamless Rubber Co., F.O.S. Industrial Tape Div., New Haven 3, Conn.

Sears, Merle, Paper Box Co., 1024 Industrial Ave., Danville, Ill.
Seasongood Folding Box Co., The, N. State St., Harrison, Ohio
Seattle Box Co., 401 Spokane St., Seattle 4, Wash.
Security Carton Co., Crichton Station, Mobile, Ala.
•Sefton Fibre Can Co., 3275 Big Bend Blvd., St. Louis 17, Mo.
•Semet-Solvay Petrochemical Div., Allied Chemical & Dye Corp., 40 Rector St., New York 6, N. Y.
Sentinel Bag & Paper Co., Inc., 219–36th St., Brooklyn 32, N. Y.
Seri-Print, Inc., 205 Cherry St., Waterbury, Conn.
Service Carton Co., 28 E. 29th St., Brooklyn, N. Y.
Service Caster & Truck Corp., 500 N. Brownswood Ave., Albion, Mich.
Service Folding Box Co., Inc., 28 E. 29th St., Brooklyn 26, N. Y.
Service Industries, 2103-07 E. Somerset St., Philadelphia 34, Pa.
Service Paper Box Co., 309 N. Memorial Drive, St. Louis 2, Mo.
Servon, Inc., 116 Broad St., New York 4, N. Y.
Seward Industries, Inc., 111 Hudson St., New York 13, N. Y.
Seymour & Peck Co., Box 61, Blue Island, Ill.
Shadur Box Co., 5110 N. 35th St., Milwaukee 9, Wis.
Shampaint, Citron, Clark, Inc., 43 York St., Brooklyn, N. Y.
Shamrock Paper Co., 300 Lynch St., St. Louis 18, Mo.
Shannon, Alexander J., Co., The, 150 Broadway, New York, N. Y.
Shannon Industries, Inc., Box 510, Glen Cove, N. Y.
Shaw, A. E. & R. C., 5614 S. Blackstone St., Chicago, Ill.
Shaw Insulator Co., 160 Coit St., Irvington 11, N. J.
Shaw Paper Box Co., 37 Sabin St., Pawtucket, R. I.
Shawano Paper Mills, Shawano, Wis.
Shawmut Waxed Paper Co., Railroad St., Holliston 2, Mass.
•Shaw-Randall Co., Inc., 39 Sabin St., Pawtucket, R. I.
Shawray Printing Corp., 398 Broadway, New York, N. Y.
Shayn, John, 54 W. 46th St., New York 36, N. Y.
Sheboygan Paper Box Co., 716 Clara Ave., Sheboygan, Wis.
•Sheffield Tube Corp., The, 170 Broad St., New London, Conn.
Shelby Paper Box Co., The, 4081 W. 150th St., Cleveland 11, Ohio
Sheller Mfg. Corp., Portland, Ind.
Shelton Mfg. Co., Inc., 591 Ferry St., Newark 5, N. J.
Sheppard Envelope Co., 1 Envelope Terrace, Worcester 4, Mass.
Sherman Paper Products Corp., 156 Oak St., Newton 64, Mass.
Shillington Box & Lumber Co., 200 Chouteau Ave., St. Louis 2, Mo.
Shoe Form Co., Inc., 26 Aurelius Ave., Auburn, N. Y.
Shopsin Paper Co., 92 Vandam St., New York 13, N. Y.
Shore Line Industries, Inc., Railroad Ave., Clinton, Conn.
Shoup-Owens, Inc., 1100 Adams St., Hoboken, N. J.
Shredded Paper Products Co., 6-8 S. Schroeder St., Baltimore 23, Md.
Shredmaster Corp., The, Grand & Willoughby Aves., Brooklyn 5, N. Y.
Shultz Folding Box Co., 1036 Arcade Bldg., St. Louis 1, Mo.
Shuman, Frank G., Co., The, 600 W. Jackson Blvd., Chicago 6, Ill.
Shumann Equipment Co., 647 W. Magnolia Ave., Louisville, Ky.
Shuttleworth Carton Co., 474 West Broadway, New York, N. Y.
Sidney Paper Box Co., 700 E. Main St., Blanchester, Ohio
Signode Steel Strapping Co., 2600 N. Western Ave., Chicago 47, Ill.
Silicone Paper Co. of America, Inc., 230 Park Ave., New York 17, N. Y.
Sill Industries, 187 Maplewood Ave., Maplewood, N. J.
Sillcocks-Miller Co., 10 W. Parker Ave., Maplewood, N. J.
•Simco Co., The, 920 Walnut St., Lansdale, Pa.
Simkins Paper Box Mfg. Co., Second & Cambria Sts., Philadelphia 33, Pa.
Simon Adhesive Products Corp., 424 W. 33rd St., New York 1, N. Y.
Simonds Saw & Steel Co., 470 Main St., Fitchburg, Mass.
•Simplex Packaging Machinery, Inc., 534 —23rd Ave., Oakland 6, Calif.
Simplex Packaging Service, 387—40th St., Oakland 9, Calif.
•Simplex Paper Box Corp., Janet & Marshall Aves., Lancaster, Pa.
Simpliform Co., 2035 Washington Ave., St. Louis 3, Mo.
Simpson & Doeller Co., The, 2827 E. Preston St., Baltimore 13, Md.
•Sinclair & Valentine Co., 611 W. 129th St., New York 27, N. Y.
Singer, Lawrence, H., 14 Bench Lane, Levittown, N. Y.
Singer Sewing Machine Co., 149 Broadway, New York 6, N. Y.
Siris, A. J., Products Corp., 780 E. 134th St., New York 54, N. Y.
Sisalkraft Co., The, 205 W. Wacker Drive, Chicago 6, Ill.
Skarnes Engineering & Supply, Inc., 2907 E. Franklin Ave., Minneapolis 6, Minn.
Skill-Craft, Inc., 1860 E. Market St., Akron 5, Ohio
Slick Products, P. O. Box 484, New York 10, N. Y.
Slick-Shine Co., The, 207-15 Astor St., Newark 5, N. J.
Sloan Folding Box Corp., 59 Halstead Ave., Buffalo 12, N. Y.
Slobodkin, Simon, 1107 Broadway, New York 10, N. Y.
•Smith, H. P., Paper Co., 5001 W. 66th St., Chicago 38, Ill.
Smith-Lustig Paper Box Mfg. Co., The, 2165 E. 31st St., Cleveland 15, Ohio
Smith-Palmer Machine Div., Price National Corp., 3235 W. Chicago Ave., Chicago 51, Ill.
Smith, S. K., Co., The, 2857 N. Western Ave., Chicago 18, Ill.
Smith-Stewart Paper Products, Inc., 10 Jay St., Brooklyn 1, N. Y.
Smith & Winchester Mfg. Co., The, So. Windham, Conn.
Smithe, F. L., Machine Co., Inc., 645 W. 44th St., New York 36, N. Y.
Snell, Foster D., Inc., 29 W. 15th St., New York 11, N. Y.
Snyder & Black, 200 William St., New York, N. Y.
Snyder, George H., Inc., 3645 N. Smedley St., Philadelphia 40, Pa.
Snyder, Gilbert D., 254 W. 31st St., New York 1, N. Y.
Society of Industrial Packaging & Materials Handling Engineers, 111 W. Jackson Blvd., Chicago 4, Ill.
Society of the Plastics Industry, Inc., The, 67 W. 44th St., New York 36, N. Y.
Solid Fibre Box Group, 1145—Nineteenth St., N.W., Washington 6, D. C.
Solo Cup Co., 28 E. Jackson Blvd., Chicago 4, Ill.
Somerset Industrial Designs, Vanderveer Parkway, Somerville, N. J.
Sonoco Products Co., Hartsville, S. C.
Sonorol Laboratories, 1910 Webster Ave., New York 57, N. Y.
Sorg Paper Co., The, 901 Manchester Ave., Middletown, Ohio
Souhegan Mills, Inc., Wilton, N. H.
South Bend Box Co., Div. of General Building Materials, Inc., 227 West Broadway, South Bend, Ind.
Southern Advance Bag & Paper Co., Inc., 38 Newbury St., Boston 16, Mass.
Southern Box & Crate Assn., 701 Giddens-Lane Bldg., Shreveport, La.
Southern California Plastic Co., 1805 Flower St., Glendale 1, Calif.
Southern Crate & Veneer Co., Macon, Ga.
•Southern Gravure Service, Inc., 2823 S. Floyd St., Louisville, Ky.
Southern Lumber & Mfg. Co., Ellijay, Ga.
Southern Paper Box Co., 201 Rock St., Little Rock, Ark.
Southern Plastics Co., 408 Pendleton St., Columbia, S. C.
Southern Press, 131 W. Main St., Louisville 2, Ky.
Southern Printape Co., 44 Seventh St., N. St. Petersburg, Fla.
Southland Paper Converting Co., 4489 Bandini Blvd., Los Angeles 23, Calif.
Southline Metal Products Co., 2115 Sabine St., Houston 10, Texas
Southport Manufacturing Co., 301 Natchez Bldg., New Orleans, La.
Southwick, C. A., Jr., Hope, N. J.
Sovereign Paper Corp., 10-14 Wilsey Square, Ridgewood, N. J.
Sparks Corp., The, Shurs Lane & Pechin St., Philadelphia, Pa.
Sparks, J. V., Inc., 1435 W. Ocean Blvd., Long Beach 2, Calif.
Spear Box Co., Inc., 270 Eleventh Ave., New York 31, N. Y.
Spec-Fab Co., Inc., 1825 E. Boston Ave., Philadelphia 25, Pa.
Special Glass Products Co., 10 W. 33rd St., New York 1, N. Y.
Specialty Automatic Machine Corp., 88 Gerrish Ave., Chelsea 50, Mass.
Specialty Converters, Inc., Mill Lane, East Braintree 84, Mass.
Specialty Paper Box Co., 6310 Avalon Blvd., Los Angeles 3, Calif.
Specialty Papers Co., The, 802 Miami Chapel Rd., Dayton 1, Ohio
Specification Packaging Engr. Corp., 3086 N. Avon St., Burbank, Calif.
Spectrum Mfg. Co., Inc., Dayton Road, Waterford, Conn.
Speed Products Co., Inc., 32-01 Queens Blvd., Long Island City 1, N. Y.
Speed Wrap, Inc., 705-6 First National Bank Bldg., Denver 2, Colo.
Speedry Products, Inc., 91-31—121st St., Richmond Hill 18, N. Y.
Speedmaster Packaging Corp., 500 W. 52nd St., New York 19, N. Y.
Speedways Conveyors, Inc., 202-08 Rhode Island St., Buffalo 13, N. Y.
Spencer Chemical Co., Dwight Building, Kansas City 5, Mo.
Spenzer Container Corp., Greenville, Pa.
Spielman Co., Inc., 161 Leverington Ave., Philadelphia 31, Pa.
Spilman, Raymond, 308 E. 50th St., New York 22, N. Y.
Spitzer Paper Box Co., The, 3051 Monroe St., Toledo 6, Ohio
Sponge Rubber Products Co., The, Shelton, Conn.
Sprayon Products, Inc., 2075 E. 65th St., Cleveland 3, Ohio
Springfield Coated Paper Corp., 9th & Bailey Sts., Camden 2, N. J.
Sprout, Waldron & Co., Inc., Muncy, Pa.
Sprowles & Allen, Inc., York & Jasper Sts., Philadelphia 25, Pa.
Spuehler, Ernst A., Studio, P. O. Box 245, Elgin, Ill.
Squeez-Easy Dispenser & Container Corp., P. O. Box 502, Salem, Ore.

Squire-Cogswell Co., 4140 N. Kedzie Ave., Chicago 18, Ill.
Srofe, Jesse, 1301 Carew Tower, Cincinnati 2, Ohio
Staff Die Cutting Co., 40 W. 22nd St., New York 10, N. Y.
Stahl, Gerald, 12 E. 46th St., New York 17, N. Y.
Stahlhut, Henry J., 33 E. 39th St., New York, N. Y.
Stalfort, John C., & Sons, Inc., 319 W. Pratt St., Baltimore 1, Md.
Standard Bag Sales Co., Inc., 29-10 Hunters Point Ave., Long Island City 1, N. Y.
Standard Box Co., 27th St., & A.V.R.R., Pittsburgh 17, Pa.
Standard Cellulose & Novelty Co., Inc., 784-48——129th St., Richmond Hill 15, N. Y.
Standard Collapsible Tube Co., Box 271, Rochester, Pa.
Standard Conveyor Co., 315 N.W. Second St., No. St. Paul 9, Minn.
Standard Corrugated Case Corp., 686 Grand Ave., Ridgefield, N. J.
Standard Envelope Mfg. Co., 1600 E. 30th St., Cleveland 4, Ohio
Standard Folding Trays Corp., 85th St. & 24th Ave., Jackson Heights, N. Y.
Standard Insulation Co., 74 Paterson Ave., East Rutherford, N. J.
•Standard-Knapp, Div. of Emhart Mfg. Co., Main St., Portland, Conn.
•Standard Packaging Corp., Flex-Vac Div., 551 Fifth Ave., New York 17, N. Y.
Standard Packaging Corp., General Felt Products Div., 68——35th St., Brooklyn 32, N. Y.
Standard Paper Box Corp., 3837 Broadway Place, Los Angeles 41, Calif.
Standard Paper Box Machine Co., Inc., 133 Bleecker St., New York 12, N. Y.
Standard Pressed Steel Co., Jenkintown, Pa.
Standard Process Corp., 2704 W. Roscoe St., Chicago 18, Ill.
Standard Rolling Mills, Inc., 196 Diamond St., Brooklyn 22, N. Y.
Standard Tool Co., Leominster, Mass.
Standard Valve & Coupler Corp., 1114 Ulysses St., Minneapolis 13, Minn.
Stanford Engineering Co., Rt. 50 West, P. O. Box 38, Salem, Ill.
Stanley Impressions, Inc., 350 W. Fourth St., New York, N. Y.
Stanley Works, The, Steel Strapping Div., 199 Lake St., New Britain, Conn.
Stanton Paper Box Co., Inc., 218 Liberty St., Oneida, N. Y.
Staplex Co., The, 777 Fifth Ave., Brooklyn 32, N. Y.
Star Band Co., Inc., Broad & Commerce Sts., Portsmouth, Va.
Star Case Co., The, 76 Madison Ave., New York 16, N. Y.
Star Sample Card Co., 18-20 W. 21st St., New York 10, N. Y.
Star Stoneware Co., Crooksville, Ohio
•Staude, E. G., Mfg. Co., Inc., 2675 University Ave., St. Paul 14, Minn.
Sta-Vis Oil Co., 220 Eagle St., St. Paul 2, Minn.
Sta-Warm Electric Co., 553 N. Chestnut St., Ravenna, Ohio
Stecher-Traung Lithograph Corp., 274 N. Goodman St., Rochester 7, N. Y.
Steck Co., The, 205 W. Ninth St., Austin 61, Texas
Stecker Paper Box Co., 9321 Michigan Ave., Detroit 10, Mich.
Steel Cooperage Div., The Serrick Corp., 4801 Bellevue Ave., Detroit 7, Mich.
Steel Parts Mfg. Co., Div. of Blackstone Mfg. Co., 4630 W. Harrison St., Chicago 44, Ill.
Steel Shipping Container Institute, Inc., 600 Fifth Ave., New York 20, N. Y.
Steel & Tin Products Co., President & Fawn Sts., Baltimore 2, Md.
Steigerwald, A. M., Co., 910 W. Van Buren St., Chicago 7, Ill.
Stein Bros. Paper Box Co., 2942 Carroll Ave., Chicago 12, Ill.
Stein, Hall & Co., Inc., 285 Madison Ave., New York 17, N. Y.
Steiner Plastics Mfg. Co., Inc., Pratt Oval, Glen Cove, N. Y.
Steinmetz, Christian, & Sons Co., 25th & Wood Sts., Wheeling, W. Va.
Steinweiss, Alex, 141 Cayuga Ave., Atlantic Beach, N. Y.
Stemar Co., 35 E. Wacker Drive, Chicago 1, Ill.
Stensgaard, W. L., & Associates, Inc., 346 N. Justine St., Chicago 7, Ill.
Stephens-Adamson Mfg. Co., Ridgeway Ave., Aurora, Ill.
Stereotype Equipment Co., 2815 Irving Park Rd., Chicago 18, Ill.
Sterling Lumber & Supply Co., 11900 S. Halsted St., Chicago 28, Ill.
Sterling Seal Co., Inc., 316 W. 16th St., Erie, Pa.
Sterling Wasser Box Co., 221 W. Seventh Ave., Pittsburgh, Pa.
Stern, H. C., 121 Kingsway, London, W.C.2, England
Steven, William, Co., 6666 Santa Monica Blvd., Los Angeles 38, Calif.
Stevens, Brooks, Associates, 622 N. Water St., Milwaukee 2, Wis.
Stevens, C. E., Bros., Inc., Stevens Bldg., Baltimore 1, Md.
Stevens-Nelson Paper Corp., 109 E. 31st St., New York 16, N. Y.
Stevens-Wiley Mfg. Co., Inc., The, 1601 W. Glenwood Ave., Philadelphia 32, Pa.
Stiles Conveyors & Transmissions, 596 N.W. 54th St., Miami 37, Fla.
Stocker Manufacturing Co., Netcong, N. J.
Stoffel Seals Corp., 145 Main St., Tuckahoe 7, N. Y.
Stokes Equipment Co., N.E. Corner School Lane & Wayne St., Philadelphia 44, Pa.
Stokes, F. J., Machine Co., 5500 Tabor Road, Philadelphia 20, Pa.
Stokes Molded Products, Inc., Taylor & Webster Sts., Trenton 4, N. J.
•Stokes & Smith Co., Sub. Food Machinery & Chemical Corp., 4942 Summerdale Ave., Philadelphia 24, Pa.
Stone Container Corp., 4200 W. 42nd Place, Chicago 32, Ill.
Stone & Forsythe Co., 67 Kingston St., Everett, Mass.
Stone Paper Tube Co., 900 Franklin St., N.E., Washington 17, D. C.
Stonington Paper Tube Co., Inc., Greenmanville Ave., Mystic, Conn.
Strachan & Henshaw Ltd., Chalks Rd., Whitehall, Bristol 5, England
•Stranahan Foil Co., Inc., 100 Wesley St., So. Hackensack, N. J.
Strange, John, Carton Co., Washington St., Menasha, Wis.
Strange, John, Pail Co., Washington St., Menasha, Wis.
Strauss, Golman & Goldman Co., 1841 Levee St., Dallas, Texas
Streator Dependable Mfg. Co., 410 West Broadway, Streator, Ill.
Streeter-Amet Co., 4101 Ravenswood Ave., Chicago 13, Ill.
Strobridge Lithographing Co., Norwood Station, Cincinnati 12, Ohio
Strong, Cobb & Co., Inc., 2654 Lisbon Road, Cleveland 4, Ohio
Strouse, Adler Co., The, 78 Olive St., New Haven 7, Conn.
Sturgis Cartons, Inc., 305 W. South St., Sturgis, Mich.
Stuyvesant Engineering Co., 107 Stuyvesant Ave., Lyndhurst, N. J.
Stylecraft Packaging Service, Inc., 3407 South Blvd., Charlotte 3, N. C.
Stylecraft Paper Box Co., Inc., 341——39th St., Brooklyn 32 N. Y.
Stylepak Box Corp., 1142 Wall St., Los Angeles 15, Calif.
Sullivan Heat Sealing Equipment Co., 135 N. 22nd St., Philadelphia 3, Pa.
Sulphite Paper Manufacturers Association, Inc., 122 E. 42nd St., New York 17, N. Y.
Summit Container Co., 188 W. Randolph St., Chicago 1, Ill.
Summon & Summon, 114 E. 54th St., New York 22, N. Y.
Sun Oil Co., Philadelphia 3, Pa.
•Sun Tube Corp., 181 Long Ave., Hillside 5, N. J.
•Sunex, Div. Sun Tube Corp., 181 Long Ave., Hillside 5, N. J.
Sunway Fruit Products, Inc., 131 Simcoe St., Toronto 1, Ont., Canada
Superior Displays, Inc., 1112 Boylston St., Boston 15, Mass.
Superior Folding Box Co., 4170 Geraldine Ave., St. Louis 15, Mo.
Superior Marking Equipment Co., 1800 W. Larchmont Ave., Chicago 13, Ill.
Superior Paper Box Co., 625-9 W. Thompson St., Philadelphia 22, Pa.
Superior Paper Products Co., Mount Wolf, Pa.
Superior Paper Products Co., Inc., 655 Lincoln Blvd., Marion, Ind.
Superior Plastics, Inc., 410-430 N. Oakley Blvd., Chicago 12, Ill.
Superior Printing Ink Co., Inc., 295-309 Lafayette St., New York 12, N. Y.
Superior Products Co., 1112 Boylston St., Boston 15, Mass.
Superior Tape Corp., 214 Richardson St., Brooklyn 22, N. Y.
Supermatic Packaging Corp., 132 Pacific St., Newark 2, N. J.
Supreme Displays, Inc., 520 W. 43rd St., New York 36, N. Y.
Supreme Gem Paper & Twine Co., 118 W. 22nd St., New York 11, N. Y.
Supreme Ribbon Corp., 149 Wooster St., New York 12, N. Y.
Sure-Seal Corp., 2100 W. 4th North, Salt Lake City, Utah
Surface Chemicals, Inc., 1101 Thompson Ave., McKees Rocks, Pa.
•Sutherland Paper Co., 243 E. Paterson St., Kalamazoo, Mich.
Sutnar-office, 307 E. 37th St., New York 16, N. Y.
Sutphen, Frank J., Co., 664 N. Michigan Ave., Chicago 11, Ill.
Swan Machine Co., 1151 Broadway, New York 1, N. Y.
Swan Metal Cap Co., Inc., 108 N. Jefferson St., Chicago 6, Ill.
•Swanson, W. H., & Co., 1220 Washington Ave., Wilmette, Ill.
Swayze Folding Box Co., Inc., Troy St., Canton, Pa.
Sweeney Lithograph Co., Inc., 69 Academy St., Belleville 9, N. J.
•Sweetman, George H. Inc., 286 Portland St., Cambridge 41, Mass.
Swibold, Duane, 1415 Williamson Road, Saginaw, Mich.
Swift & Co., Union Stock Yards, Chicago 9, Ill.
Swift, M., & Sons, Inc., 10 Love Lane, Hartford, Conn.
Swiss Industrial Co., Neuhausen, Rhine Falls, Switzerland
Switzer Brothers, Inc., 4732 St. Clair Ave., Cleveland 3, Ohio
Sylvan Plastics, Inc., 350 Fifth Ave., New York 1, N. Y.
Synthetasine Protective Coatings, Inc., 600 Fifth Ave., New York 20, N. Y.
Syntron Co., 250 Lexington Ave., Homer City, Pa.
Synvar Corp., Wilmington 99, Del.
Syracuse Ornamental Co., Inc., 581 S. Clinton St., Syracuse 2, N. Y.
Syracuse Paper Box Co., Inc., 219 Wyoming St., Rochester 4, N. Y.

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•Taber Instrument Corp., 111 Goundry St., No. Tonawanda, N. Y.
Tablet & Ticket Co., The, 1021 W. Adams St., Chicago 7, Ill.
Tab-Ty Boxes, Inc., 2319 Bartlett St., Houston 6, Texas
Taco West Corp., 525 N. Noble St., Chicago 22, Ill.
Taffel Bros., Inc., 95 Madison Ave., New York 16, N. Y.
Taft-Peirce Mfg. Co., The, 32 Mechanics Ave., Woonsocket, R. I.
Taft, R. C., Co., 25-27 S. Wacker Drive, Chicago 6, Ill.
Talladega Box & Lumber Co., P. O. Box 51, Talladega, Ala.
Talley's Veneer & Crate Co., Adel, Ga.
Talmadge Printing Co., 23 Ferry St., New York 38, N. Y.
Talmalin Mfg. Co., 611 Broadway, New York 12, N. Y.
Tammen & Denison, Inc., 650 S. Clark St., Chicago 5, Ill.
Tanglefoot Co., The, 314 Straight Ave., S.W., Grand Rapids 4, Mich.
Tanzi, Aurelio, Corp., 430 Jefferson St., Brooklyn 37, N. Y.
Tapex Corp., 217 Astor St., Newark 5, N. J.
Tapper, William, 30 South Broadway, Yonkers 2, N. Y.
Taranger, E., Inc., 441 Lexington Ave., New York 17, N. Y.
Tarpey, Thomas, 1 Maple Crest Court, Louisville 6, Ky.
Tarshis, Nathan L., Co., 1123 Broadway, New York 10, N. Y.
Tart Cooperage Co., Box #3363, Jacksonville, Fla.
Tavor, Luba, 1393 Sixth Ave., New York 19, N. Y.
Taylor Box Co., 293 Child St., Warren, R. I.
Taylor, Charles H., Maple Road, Riverside, Conn.
Taylor Fibre Co., Norristown, Pa.
Taylor-Reed Corp., The, 15 Crescent St., Glenbrook, Conn.
Taylor, Stiles & Co., Riegelsville, N. J.
Taylor, Thomas, & Sons, Hudson, Mass.
Teague, Walter Dorwin, Associates, 444 Madison Ave., New York 22, N. Y.
Tearne's Automatic Devices Ltd., 102 Wedley Park Road, Birmingham, England
Tech-Art Plastics Co., Inc., Ridgedale Ave., Morristown, N. J.
Technical Assn. of the Pulp & Paper Industry, 155 E. 44th St., New York 17, N. Y.
Technical Tape Corp., W. 177th St. & Harlem River, New York 53, N. Y.
Techniglas, Adamston, N. J.
Technopol Laboratories Ltd., 212 St. John St., London, E.C.1, England
Tecpak, S. A., Apartado Postal 24642, Mexico 12, D. F.
Teddy Studios, 22 E. 17th St., New York 3, N. Y.
•Teepack Spezialmaschinen G.M.B.H., Kevelaerer Strasse 19-23, Dusseldorf, Germany
Tee-Pak, Inc., 3520 S. Morgan St., Chicago 9, Ill.
•Tele-Sonic Packaging Corp., 1170 Broadway, New York 1, N. Y.
Tell City Furniture Co., Inc., 666 Lake Shore Drive, Chicago 11, Ill.
Temple Mfg. Co., P. O. Box 567, Dallas 1, Texas
Tennessee Paper Mills, Inc., Manufacturer's Road, Chattanooga, Tenn.
Tenney Engineering, Inc., 1090 Springfield Rd., Union, N. J.
Tension Envelope Corp., 19th & Campbell Sts., Kansas City 8, Mo.
Tensolite Corp., The, No. Tarrytown, N. Y.
Terkelsen Machine Co., 326 A St., Boston 10, Mass.
Terre Haute Cooperage, Inc., Twelve Points P. O. Box 8, Terre Haute, Ind.
Testing Machines, Inc., 123 W. 64th St., New York 23, N. Y.
Testworth Laboratories, Inc., Commercial Rd., Addison, Ill.
Textile Bag Manufacturers Assn., 611 Davis St., Evanston, Ill.
Textile Color Card Assn. of U. S., Inc., 200 Madison Ave., New York, N. Y.
Textileather Corp., 607 Madison Ave., Toledo 3, Ohio
Thatcher Glass Mfg. Co., Inc., Grand Central Ave., Elmira, N. Y.
Thayer, Henry, Co., 100 Inman St., Cambridge 39, Mass.
Thaver Scale & Engineering Corp., 494 E. Water St., Rockland, Mass.
Thermel, Inc., 3440 W. Lake St., Chicago 24, Ill.
•Thilmany Pulp & Paper Co., Thilmany Rd., Kaukauna, Wis.
Thomas, R. P., Co., Inc., 316 Westbury Ave., Carle Place, N. Y.
Thomas Stationery Mfg. Co., Springfield, Ohio
Thomas Truck & Caster Co., 68 Mississippi River, Keokuk, Iowa
Thompson, Bernard L., 130 W. 42nd St., New York 36, N. Y.
Thompson Can Co., 13401 Denton Drive, Dallas 34, Texas
•Thompson, James, & Co., Inc., 112 Prince St., New York 12, N. Y.
Thompson, Ltd., 130 W. 42nd St., New York 36, N. Y.
Thomson-National Press Co., Inc., Dean Ave., Franklin, Mass.
Thormac, Inc., 2141 N. Franklin St., Chicago 14, Ill.
Thorpe, F. M., Mfg. Co., 1801 Gulf St., Lamar, Mo.
Thrissel Engineering Co. Ltd., The, Easton Road, Bristol 5, England
Thwing-Albert Instrument Co., 5396 Pulaski Ave., Philadelphia 44, Pa.
Tickner, E. C., 25 Oak Ridge Ave., Summit, N. J.
Tilbury Refining Corp., 21 Dunham Place, Brooklyn 11, N. Y.
Tillery Container Co., 6000 Wilson Ave., Kansas City 23, Mo.
Timber Products Co., P. O. Box 1032, Medford, Ore.
Time-Saving Specialties, 2816 Dupont Ave., S., Minneapolis 8, Minn.
Timely Packaging Associates, 369 Lexington Ave., New York 17, N. Y.
Tipp Manufacturing Co., The, 4th & Franklin St., Tipp City, Ohio
Tipper Tie, Inc., 1018 Stuyvesant Ave., Union, N. J.
Tite-Cap Machine Co., Inc., 56A Rose St., New York 38, N. Y.
Tobin-Howe Paper Box Co., 211 Mt. Prospect Ave., Clifton, N. J.
Todt, Fred, Co., 2021 S. Hill St., Los Angeles 7, Calif.
Toilet Goods Assn., Inc., 9 Rockefeller Plaza, New York, N. Y.
Toledo Paper Box Co., The, 112-124 True St., Toledo 7, Ohio
•Toledo Scale Co., Telegraph Road, Toledo 1, Ohio
Tompkins' Label Service, Frankford at Allegheny Ave., Philadelphia 34, Pa.
Topflight Corp., York, Pa.
Toronto Type Foundry Co. Ltd., 120 Wellington St., W., Toronto, Canada
Torsion Balance Co., The, Monhegan St., Clifton, N. J.
Tower Container Corp., 1816 Boston Road, New York 52, N. Y.
Tower Envelope Co., 1263 Virginia Ave., New York 72, N. Y.
Townson, W. D., Lumber Co., Ranger Road, Murphy, N. C.
Tracy, Kent & Co., Inc., 515 Madison Ave., New York 22, N. Y.
Trans Flex Packagers, 40 Burnham Ave., Unionville, Conn.
Transilwrap Co., 2814 Fullerton Ave., Chicago 47, Ill.
Trans-Packers, Inc., 122 Washington Ave., Brooklyn 5, N. Y.
Transparent Fabricators, Inc., 220 Fifth Ave., New York, N. Y.
Transparent Package Co., 3520 S. Morgan St., Chicago 9, Ill.
Transparent Packaging Corp., 1323 Randall Ave., New York 59, N. Y.
Transparent Paper Ltd., Strand St., London, W.C.2, England
Transparent Plastics Container Co., 555 W. 23rd St., New York 11, N. Y.
Transparent Products Co., Inc., 324 E. 24th St., New York 10, N. Y.
Transparent Specialties Corp., 3828 E. 91st St., Cleveland 5, Ohio
Transparent Tube Co., 4431 W. Diversey, Chicago, Ill.
Trapow, D., & Co. Ltd., 113 Regents Park Road, London, N.W.1, England
Trautmann, Bailey & Blampey, 13 Laight St., New York 13, N. Y.
•Traver Investments, Inc., 1242 Lake Shore Drive, Chicago 10, Ill.
Travers & Co., 665 Atlantic Ave., Boston 11, Mass.
Treen Box Co., Tioga & Memphis Sts., Philadelphia, Pa.
Trefolex, 151 Sherman Ave., New York 34, N. Y.
Trenton Folding Box Co., 100-106 Ewing St., Trenton 5, N. J.
•Trescott Co., Inc., 62 N. Main St., Fairport, N. Y.
Triangle Container Corp., 1501 W. 15th St., Chicago 8, Ill.
Triangle Ink & Color Co., Inc., 329 E. 29th St., New York 16, N. Y.
•Triangle Package Machinery Co., 6633-55 W. Diversey Ave., Chicago 35, Ill.
Triangle Paper Bag Mfg. Co., The, 1301 Madison Ave., Covington, Ky.
Triangle Paper & Box Co., 1501 W. 15th St., Chicago 8, Ill.
Tri-Boro Carton Co., Inc., 85 Classon Ave., Brooklyn 5, N. Y.
Trilsch, Oscar, Co., 150-25—18th Ave., Whitestone 57, N. Y.
Trio Metal Cap Co., 317 N. Francisco Ave., Chicago 12, Ill.
Tri-Pak Machinery Service, Inc., P. O. Box 1228, Harlingen, Texas
Triplex Industries, Inc., Riverdale Station, Chicago 27, Ill.
Tripp Tape, Inc., 1975 N. Cornell St., Melrose Park, Ill.
Tri-State Packers' Assn., Inc., Masonic Bldg., Easton, Md.
•Tri-State Plastic Molding Co., Inc., Fourth & Ingram Sts., Henderson, Ky.
Trophy Papers, Inc., Gatehouse Rd., Holyoke, Mass.
Trowbridge Conveyor Co., 851 Van Houten Ave., Clifton, N. J.
Truscon Steel Co., Pressed Steel Div., 6100 Truscon Ave., Cleveland 4, Ohio
Trum, E. J., Inc., 80 Richards St., Brooklyn 31, N. Y.
Tubed Chemicals Corp., 2 Pine St., Easthampton, Mass.
•Tupper Corp., Blackstone, Mass.
Turner Brothers, 615 N. Main St., Wellington 1, Ohio
Turner, J. S., White Metal Co., New Brunswick, N. J.
Turret Seal Corp., 59 E. Van Buren St., Chicago 5, Ill.
Twinkle Display & Mfg. Co., 3400 Armstrong Ave., Dallas 5, Texas
Twitchell, E. W., Inc., Packaging Div., 2801 N. Third St., Philadelphia 33, Pa.
Twombly, C. E., Co., 146 Mystic Ave., Medford 55, Mass.

Tymatics, Inc., 2720 Sylvan Ave., Dallas, Texas
Type & Press of Illinois, Inc., 3312 N. Ravenswood Ave., Chicago 13, Ill.

U

Ullman Bag Co., 2461 W. Warren St., Detroit 8, Mich.
Ullman, Martin, 113 W. 57th St., New York, N. Y.
Ullman, Sigmund, Co., Div. Sun Chemical Corp., 10-10——44th Ave., Long Island City 1, N. Y.
Ullmann Bag Co., 2461 W. Warren St., Detroit 8, Mich.
Umland & Co., 256 Sutter St., San Francisco 8, Calif.
Unex, Inc., Route 46 & 23rd Circle, Little Falls, N. J.
Unger Paper Co., 211-215 W. 20th St., New York 11, N. Y.
Uni-Mark, Inc., 113 Albany St., Boston 11, Mass.
Union Bag & Paper Corp., 233 Broadway, New York 7, N. Y.
Union Bay State Chemical Co., Inc., 491 Main St., Cambridge 42, Mass.
Union Paste Co., 1605 Hyde Park Ave., Hyde Park 36, Mass.
Union Plastic Films Co., 3518 S. Morgan St., Chicago, Ill.
Union Special Machine Co., 400 N. Franklin St., Chicago 10, Ill.
Union Specialty Co., 57 Main St., Bloomingdale, N. J.
Union Standard Equipment Co., 318-322 Lafayette St., New York 12, N. Y.
Union Steel Products Co., 504 N. Berrien St., Albion, Mich.
Union Wadding Co., 125 Goff Ave., Barrington, R. I.
Unique Printed Products Co., Inc., 2222 N. 13th St., Terre Haute, Ind.
Unit-Packet Co., 10 Burlington Ave., Wilmington, Mass.
•United Board & Carton Corp., 2 Park Ave., New York 22, N. Y.
•United Can Co., Inc., Box 42, Phillipsburg, N. J.
United Carton Co., 727 N. Kedzie Ave., Chicago 12, Ill.
United Comb & Novelty Co., Inc., 161 Sixth St., Leominster, Mass.
United Container Co., 56th & Lancaster Ave., Philadelphia 31, Pa.
United Elastic Corp., Easthampton, Mass.
United Mfg. Co., The, 168 Birnie Ave., Springfield 7, Mass.
United Mineral & Chemical Corp., 16 Hudson St., New York 13, N. Y.
United Packaging Co., Inc., 4511 Wayne Ave., Philadelphia 44, Pa.
United Paper Box Co., 460 Bryant St., San Francisco 7, Calif.
United Paper Box Co., Inc., Water St., Holyoke, Mass.
United Paper Box Corp., 727 N. Kedzie Ave., Chicago 12, Ill.
•U. S. Automatic Box Machinery Co., Inc., 18 Arboretum Road, Roslindale, Boston 31, Mass.
United States Bag Co., 4604 Dodge St., Omaha 3, Neb.
•U. S. Bottlers Machinery Co., 4015 N. Rockwell St., Chicago 18, Ill.
U. S. Corrugated Fibre Box Co., The, 1409 Roosevelt Ave., Indianapolis 7, Ind.
•U. S. Engineering Co., 40-24——22nd St., Long Island City 1, N. Y.
•United States Envelope Co., 21 Cypress St., Springfield 2, Mass.
U. S. Fibre & Plastics Corp., Union St., Stirling, N. J.
U. S. Finishing & Mfg. Co., 775 W. Jackson Blvd., Chicago 6, Ill.
United States Gasket Co., 600 N. 10th St., Camden 1, N. J.
U. S. Industrial Chemicals Co., Div. National Distillers Products Corp., 99 Park Ave., New York 16, N. Y.
U. S. Mengel Plywoods, Inc., 1215 S. 7th St., Louisville, Ky.
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U. S. Plastic Molding Corp., Carlton St., Wallingford, Conn.
United States Plywood Corp., 55 W. 44th St., New York 36, N. Y.
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United States Tape Corp., 6903 Manchester Ave., St. Louis 17, Mo.
United States Testing Co., Inc., 1415 Park Ave., Hoboken, N. J.
United States Trademark Assn., 522 Fifth Ave., New York 36, N. Y.
United Steel Barrel Co., 225 S. 15th St., Philadelphia, Pa.
United Wallpaper Co., P. O. Box 348, Aurora, Ill.
Unitronics, Inc., 472 Paul Ave., St. Louis 21, Mo.
Unity Stamp Co., Inc., 7 W. 30th St., New York 1, N. Y.
Universal Folding Box Co., Inc., Madison & Thirteenth Sts., Hoboken, N. J.
Universal Glass Products Co., Parkersburg, W. Va.
Universal Jewelry Case Co., 165 Front St., Chicopee, Mass.
Universal Tube & Container Co., 144 Moody St., Waltham 54, Mass.
Univial Corp., The, 16 Glen Road, Rutherford, N. J.
Upressit Products Corp., Danbury, Conn.
Upson Co., The, Stevens St., Lockport, N. Y.
Utica Box Co., Inc., 2150 Erie St., Utica 4, N. Y.
Utility Crate Co., 1985 E. 16th St., Los Angeles 21, Calif.
Utility Plastic Bag Co., Div. Western Burlap Bag Co., 1101 W. 38th St., Chicago 9, Ill.

V

•Vac-Tie Fasteners, Inc., 1140 E. Jersey St., Elizabeth 4, N. J.
Vacu-Form Corp. of America, 426 Union Ave., Brooklyn 11, N. Y.
Vacuum Forming Corp., 76 S. Bayles Ave., Port Washington, N. Y.
Vacuum Molding, Inc., 123 Myrtle Ave., Boonton, N. J.
Vacuum Plastics Corp., 1096 Scott St., Columbus, Ohio
Valentine Process Corp., 60 W. Passaic St., Rochelle Park, N. J.
Valley Iron Works Co., E. South Island St., Appleton, Wis.
Valley Printing Ink Corp., 649 Cedar St., Green Bay, Wis.
Valpey Press, 65 Clinton St., Malden 76, Mass.
Valve Corp. of America, 1720 Fairfield Ave., Bridgeport, Conn.
Van Buren Wrapping Machine Corp., 750 Grand St., Brooklyn 11, N. Y.
Van Cleef Bros., Inc., Div. Johns-Manville, 7800 S. Woodlawn Ave., Chicago 19, Ill.
Van Der Muelen, G., & Zn., N. V., Prins Hendrikkade 173, Amsterdam-C., Holland
Van Der Woerd, Bart, 30 Charleton St., New York, N. Y.
Van Doren, Harold, & Associates, 1700 Walnut St., Philadelphia, Pa.
Van Dorn Iron Works Co., The, 2685 E. 79th St., Cleveland 4, Ohio
Van Leer's Vatenfabrieken N.V., Stadhouderskade 6, Amsterdam-W, Holland
Van Ness Bros., Inc., 104 Gray St., Paterson 3, N. J.
Van Pell Chemical & Supply Corp., 50 Bond St., New York 3, N. Y.
Van Rosen, Robert E., 34 W. 58th St., New York 19, N. Y.
Van Sciver, Parcher & Falk, 219 N. Broad St., Philadelphia 7, Pa.
Van Sweringen, Charles F., 52 Jackson Ave., Hackensack, N. J.
Van Vick Paper Box Co., 4904 Oneota St., Duluth 7, Minn.
Van Waardt, Wm., Co., Inc., 406 W. 31st St., New York 1, N. Y.
Vanant Products, Tomah, Wis.
Vanby Corp., 122 E. 42nd St., New York, N. Y.
Vanetta Velvet Corp., 1441 Broadway, New York 18, N. Y.
Varigraph Co., Inc., Box 690, Madison 1, Wis.
Vassos, John, 54 W. 55th St., New York 19, N. Y.
Ve-Alite Plastic Corp., 2700 Nostrand Ave., Brooklyn 10, N. Y.
Veeder-Root, Inc., 70 Sargeant St., Hartford 2, Conn.
Vegetable Parchment Mfrs. Assn., 122 E. 42nd St., New York 17, N. Y.
Velvetone Co., 108 Davis St., San Francisco 11, Calif.
Velvetone Finishing Corp., 10-40——46th Ave., Long Island City 1, N. Y.
•Venesta Ltd., Vintry House, Queens St. Place, London, E.C.4, England
Veritone Co., 2701 N. Lehmann Court, Chicago 14, Ill.
Vermillion, W. R., Co., Inc., 1413-1415 Kansas Ave., Kansas City, Mo.
Verner, B., & Co., Inc., 52 Duane St., New York 7, N. Y.
•Vernon Chemical & Mfg. Corp., 151 Mt. Vernon Ave., Mt. Vernon, N. Y.
Versen, Kurt, 4 W. Slocum Ave., Englewood, N. J.
Vertex Co., 120 Millroad, Montvale, N. J.
Vertipile, Inc., 650 Lawrence St., Lowell, Mass.
•Vertrod Corp., 2037 Utica Ave., Brooklyn 34, N. Y.
Vickers-Armstrongs, Ltd., 13 City Road, London, E.C.1, England
Vickers, Charles D., & Co., 5237 W. Chicago Ave., Chicago 51, Ill.
Vickery Tape & Machine Co., Inc., 286 W. Third St., Peru, Ind.
Victor Metal Products Corp., Highway 67 N., Newport, Ark.
Videx Corp., 150 E. 46th St., New York 17, N. Y.
Viking Engraving Corp., 1432 N. Grant Ave., Columbus 1, Ohio
Viking Paper Co., Inc., 542 West Broadway, New York 12, N. Y.
Vincent Box Co., Inc., 151 Linden St., Wellesley, Mass.
Virginia Barrel Co., Div. Greif Bros. Cooperage Corp., 178 Holland Ave., Staten Island 3, N. Y.
Virginia Laminating Co., Amelia, Va.
Virkotype Corp., 111 Rock Ave., Plainfield, N. J.
Vis-A-Pac Co., Inc., 351 Pennsylvania Ave., Beverly, N. J.
ViseGrip Products Ltd., Grand Bldgs., Trafalgar Sq., London, W.C.2, England
Visible Package Sales Corp., 540 N. Lake Shore Drive, Chicago 11, Ill.

Visking Corp., The, 6733 W. 65th St., Chicago 38, Ill.
Vis O Tube Co., 928 W. Irving Park, Chicago, Ill.
Visual Bag, Inc., 10 Van Cortlandt Ave., E., New York 68, N. Y.
Visual Packaging Co., Inc., 4901 Clarendon Road, Brooklyn 3, N. Y.
Vitachrome, Inc., 421 E. Sixth St., Los Angeles 14, Calif.
Vitra-Tone Engraving Corp., 345 Bergen St., Brooklyn 17, N. Y.
Vivash-Smith Studio, 73 Adelaide St., W., Toronto 1, Canada
Vizofilm Mfg. Corp., 344 Coster St., Bronx 59, N. Y.
Vizuall Co., Inc., The, 34 E. Tenth St., New York 3, N. Y.
•Vlchek Tool Co., The, 3001 E. 87th St., Cleveland 4, Ohio
Von Miklos, Josephine, R. R. 2, Poundridge, N. Y.
Voss, Karl, Corp., 1100 Adams St., Hoboken, N. J.
Vulcan Containers, Inc., Bellwood, Ill.
Vulcan Containers Limited, 15 Bethridge Rd., Rexdale, Toronto 15, Ont., Canada
•Vulcan Electric Co., 88 Holten St., Danvers, Mass.
Vulcan Steel Container Co., 3315 N. 35th Ave., Birmingham, Ala.

W

W.E.W. Container Co., 775 Lexington Ave., Brooklyn 21, N. Y.
Wabash Fibre Box Co., 2000 N. 19th St., Terre Haute, Ind.
Wadley Veneer & Box Co., Wadley, Ga.
Wagner Folding Box Corp., 1534 Bailey Ave., Buffalo 12, N. Y.
Wagner Iron Works, 1905 S. First St., Milwaukee 1, Wis.
Wagner, Victor, & Son, Inc., 115 Ash St., Buffalo 4, N. Y.
Waldheim, John B., Associates, 49 E. Ontario St., Chicago 11, Ill.
Waldorf Paper Products Co., 2250 Wabash Ave., St. Paul 6, Minn.
•Waldron, John, Corp., The, P. O. Box 791, New Brunswick, N. J.
Walker Bag Co., Inc., 120 N. Tenth St., Louisville 5, Ky.
Wallace Co., The, 1188 Main St., Bridgeport 3, Conn.
Wallace Container Co., Sub. Continental Can Co., 627 E. Washington St., Santa Ana, Calif.
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Walle & Co., Inc., 401 Tchoupitoulas St., New Orleans 12, La.
Walsello Products, Inc., 132 Beckwith Ave., Paterson 3, N. J.
Walton Laboratories, Inc., 1186 Grove St., Irvington 11, N. J.
Warder Paper Box Co., Inc., 832 Ashland Ave., Niagara Falls, N. Y.
Warneke Paper Box Co., 1617 Wazee St., Denver 2, Colo.
•Warner Brothers Co., The, 325 Lafayette St., Bridgeport 1, Conn.
Warner Electric Brake & Clutch Co., Beloit, Wis.
•Warren, S. D., Co., 89 Broad St., Boston 1, Mass.
Warren Wire Co., Pownal, Vt.
Warwick Wax Co., Inc., Div. Sun Chemical Corp., 10th St. & 44th Ave., Long Island City 1, N. Y.
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Waterproof Paper Manufacturers Assn., The, 11 W. 42nd St., New York 36, N. Y.
Waters Co., The, 5211 W. 66th Place, Chicago 38, Ill.
Watertown Manufacturing Co., The, 1000 Echo Lake Road, Watertown, Conn.
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Watson-Standard Co., 225 Galveston Ave., Pittsburgh 12, Pa.
Watson-Stillman Co., The, Div. H. K. Porter Co., 109 Aldene Road, Roselle, N. J.
Wax Corp. of America, 29 Dunham Place, Brooklyn 11, N. Y.
Waxed Paper Institute, Inc., 38 S. Dearborn St., Chicago 3, Ill.
Waxide Paper Co., 2011 Tracy Ave., Kansas City 8, Mo.
Wayne Paper Box & Printing Corp., 102 W. Superior St., Fort Wayne 7, Ind.
Weatherproof Fibre Box Group, 1415 Nineteenth St., N.W., Washington 6, D. C.
Weatherwax-Spurgeon & Assoc., 520 W. 7th St., Los Angeles 19, Calif.
Weaver Packaging Co., 3700 Clifton Place, Montrose, Calif.
Webb, Jervis B., Co., 8951 Alpine Ave., Detroit 4, Mich.
Weber, H. G., & Co., Inc., 725 Fremont St., Kiel, Wis.
Weber Label & Marking Systems, Div. Weber Addressing Machine Co., 200 W. Central Road, Mt. Prospect, Ill.
Webhart Corp., 33 W. Union St., Pasadena 1, Calif.
Webster, Benjamin L., Woodstock, N. Y.
Webster Mfg., Inc., Hall St., Tiffin, Ohio
Wedgewood Press, Inc., 216 W. 18th St., New York 11, N. Y.
Weigh Right Automatic Scale Co., Mills Road, Joliet, Ill.
Weil & Newman, Inc., 100 Second Ave., Brooklyn 15, N. Y.
Weiller Co., The, Castor Ave. & Amber St., Philadelphia 34, Pa.
Weil's, David, Sons Lithographic Co., 315 Berry St., Brooklyn 11, N. Y.
Weinman Brothers, Inc., 3260 W. Grand Ave., Chicago 51, Ill.
Weiss, Albert, & Co., 151-153 W. 21st St., New York 11, N. Y.
Welded Plastics Corp., 1907 Park Ave., New York 35, N. Y.
Welding Engineers, Inc., Norristown, N. J.
Wells Badger Corp., 225 W. Capitol Dr., Milwaukee 12, Wis.
Wells, George E., Inc., 918 S. Boyle Ave., St. Louis 10, Mo.
Wells Manufacturing Co., 220 Ninth St., San Francisco 3, Calif.
Wenson Co., The, 1103 Ave. C, Bayonne, N. J.
Wesco Associates, Inc., 10 E. 49th St., New York 17, N. Y.
Wessel, Stanley, & Co., 420 N. Michigan Ave., Chicago 11, Ill.
West Bend Equipment Corp., 12 Water St., West Bend, Wis.
West Carrollton Parchment Co., West Carrollton, Ohio
West Coast Mfg. & Sales Co., 3030 N. Main St., Los Angeles 31, Calif.
West Coast Plastics Distributors, Inc., 8510 Warner Drive, Culver City, Calif.
West Co., Inc., The, West Bridge St., Phoenixville, Pa.
West Instrument Corp., 525 N. Noble St., Chicago 22, Ill.
West Penn Mfg. & Supply Corp., 809 Second Ave., Brackenridge, Pa.
West Penn Oil Co., Warren, Pa.
•West Virginia Pulp & Paper Co., 230 Park Ave., New York 17, N. Y.
Westchester Plastics, Inc., 326 Waverly Ave., Mamaroneck, N. Y.
Westcott Paper Products Co., 450 Amsterdam Ave., Detroit 2, Mich.
Western Coil & Electrical Co., 215 State St., Racine, Wis.
Western Cooperage, Inc., 1805 Thurman St., Portland 9, Ore.
Western Filling Corp., 4151 Bandini Blvd., Los Angeles 23, Calif.
Western Foil Co., 3010—38th Ave., W., Seattle 99, Wash.
Western Foil Converters, 2407 Fourth St., Berkeley 10, Calif.
Western Label Co., 1129 Wall St., Los Angeles 15, Calif.
Western Lithograph Co., 600 E. Second St., Los Angeles 54, Calif.
Western Package Products Co., 510 S. Arroyo Parkway, Pasadena 1, Calif.
Western Paper Box Co., 1901 Poplar St., Oakland 7, Calif.
Western Paper Goods Co., The, 1224 W. Eighth St., Cincinnati 3, Ohio
Western Paper Products Div., Central Fibre Products Co., Inc., 460 W. Fifth South St., Salt Lake City 10, Utah
Western Stoneware Co., Monmouth, Ill.
•Western Waxed Paper Div., Crown Zellerbach Corp., 2101 Williams St., San Leandro, Calif.
Western Wirebound Box Co., P. O. Box 6148, Portland 9, Ore.
•Westfield River Paper Co., Inc., Station Road, Russell, Mass.
Westlake Plastics Co., Lenni Road, W., Lenni Mills, Pa.
Weston Paper & Mfg. Co., The, 137 N. Main St., Dayton 2, Ohio
Weyerhaeuser Timber Co., Springfield, Ore.
•Whaling Distributing Corp., 75 Varick St., New York 13, N. Y.
Wheaton Plastics Co., Weymouth Rd., Mays Landing, N. J.
Wheaton, T. C., Co., Millville, N. J.
Wheeler, Leonard Arthur, 3107 Beverly St., Los Angeles, Calif.
Wheeler-Van Label Co., 13-21 McConnell St., S.W., Grand Rapids 1, Mich.
•Wheeling Stamping Co., 2116 Water St., Wheeling, W. Va.
Wheeling Steel Corp., Wheeling, W. Va.
Whitaker-Guernsey Studio, 210 E. Ohio St., Chicago, Ill.
White Cap Co., 1819 N. Major Ave., Chicago 39, Ill.
White Container Co., 122 W. Second St., Cincinnati 2, Ohio
White Metal Manufacturing Co., 1012 Grand St., Hoboken, N. J.
White, R. G., Manufacturing Corp., 101-18—97th Ave., Ozone Park 16, N. Y.
Whiteford Paper Co., Inc., 420 Lexington Ave., New York 17, N. Y.
Whitehead & Hoag Co., 272 Sussex Ave., Newark 1, N. J.
Whiting, C. R., Co., Inc., 650 Main St., Hackensack, N. J.
Whiting, David, & Sons, Inc., 22 Highland Ave., Wilton, N. H.
Whitman Plastics Corp., 655 Summer St., Lynn, Mass.
Whitney & Co., Inc., 142 Water St., Leominster, Mass.
Whyte Mfg. Co., Inc., 115 Fourth Ave., New York 3, N. Y.
Wiener Brothers, Inc., 692 Broadway, New York 12, N. Y.
Wilco Co., 4425 Bandini Blvd., Los Angeles 23, Calif.
Wilcox Manufacturing Co., 4610 Waterloo Road, Stockton 1, Calif.
Wildon Industries, Inc., 251 E. 35th St., New York 16, N. Y.
Wilkata Folding Box Co., The, 300 Hoyt St., Kearny, N. J.
Wilkins Paper Box Co., Inc., 215 A St., Boston 10, Mass.
Williams, Bill, & Co., 313 W. 37th St., New York 18, N. Y.
Williams Brothers Paper Box Co., 1101 Broad St., St. Joseph, Mich.
Williams, Charles W., & Co., Inc., 303 Lafayette St., New York 12, N. Y.
Williams, Gabriel, Co., Inc., 130 Duffield St., Brooklyn 1, N. Y.

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